Electrical World

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Service Depends on Capital Supply

THE shares of public utility companies seem to be in little favor these days, as is evidenced from the quoted prices of various stocks. Some have reached very low levels, despite the fact that many of the properties have increased in value, in earning power and in efficiency. At the low price to-day the stock of some utilities offers a higher return to the investor, but this apparently is a time when investment yield receives scant consideration. And yet it is absolutely essential for the proper development of the industry that the utilities obtain money at reasonable rates, otherwise development will come to a standstill. The prosperity of the manufacturer, the jobber and the contractor depends in large measure on the increased activity of the central station. Moreover, without sufficient capital to meet the rapidly growing demand for electricity, service to the public is likewise curtailed.

Opportunity to Develop Foreign Water Powers

TWO of the allied powers, France and Italy, are very short of coal, and they look to the United States to help them in their distress. Neither country ever possessed much coal, but both have abundant water power, which they permit to run to waste. Being tarred with the same stick, the United States cannot with much grace remind them of this profligacy, and especially now since France has shown more enterprise than we in turning to her undeveloped water powers for relief. Italy, on the other hand, has done little toward utilizing the power of her mountain streams. This condition spells opportunity for American manufacturers of waterwheels and generators. An invaluable service can be rendered both nations by the rapid development of their water power, for not only will it help to solve the coal problem forever, but incidentally it will cut down the export of coal from this country and relieve precious ships for other work.

Changed Conditions in the Jobbing Trade

IN VIEW of competition arising from decrease in purchases and opportunities in other directions, electrical supply jobbers may profitably adjust themselves to changed conditions. Strict economy is essential. Stocks of miscellaneous supplies used in ordinary contracting and building trades will bear watching. To care for industries expanding to meet the war's needs, larger sizes of conduit, fittings, cables and switches will be in demand. Since skilled mechanics in all lines of business will receive maximum wages and will on that account be in a position to buy, household appliances of a utilitarian nature will probably become attractive. Credits and collections need to be carefully scrutinized and enough cash should be kept on hand to meet emergencies. Diminished profits must also be reckoned with.

Opportunity Knocks at the Door

ELECTRIC utility companies are essential to the country in the conduct of war. There is no substitute for the service which they sell that will not, in comparison, be wasteful of men, money and materials. Realizing their importance, these companies have two courses open to them: either they may voluntarily place all of their facilities and resources at the disposal of the government or they may wait, possibly to be conscripted for service later, but in the meantime getting for their stockholders all that they can out of the situation.

The decision is clearly up to the directors and executives. Will they take the broad view that stockholders' ultimate interests will be best served by voluntarily considering such interests as secondary to those of the country? Failing to take this view, will they be courageous enough deliberately to sacrifice their stockholders' interests to those of the country? Will they have breadth of vision and enough courage to take one or the other of these views and "carry on" in line with such a policy, or will they take the attitude of the narrow-gage politician who considers it more important to secure a post-office building for his home town than to provide ammunition for our troops?

The decision in either case means more than the passage of resolutions to spread upon the records. It may mean a radical change in the point of view both of officials of companies and members of public service commissions. Demands from the public for extension of facilities or for lower rates, demands from employees for increased wages and demands from stockholders for increased earnings can, none of them, receive more than secondary consideration. Every question must be decided on the basis of the conservation of men, money and materials—conservation being understood to mean use in such manner as will aid to the greatest possible extent in winning the war.

Then it is necessary that there shall be developed a spirit of co-operation—not only co-operation between

companies and commissions, but co-operation between them and the Fuel Administration, War Industries Board and any and all other agencies having the same purpose in view of prosecuting the war with vigorous energy to a right conclusion. Old suspicions, prejudices and fears must be forgotten. Each party to such co-operation must assume that the other is at least trying to serve his country to the best of his ability. To place the interests of the country above any other consideration, to develop a spirit of co-operation and a willingness to sacrifice selfish personal desires for power, position, prominence or property, is as good and as practical a program for companies and commissions to adopt as it is for individuals. It is the least that many of us can do.

The Electric Light a Necessity

WE REGRET to note here and there in the public press statements intended to convey the impression that electric light is a non-essential which can be, and in the interest of fuel economy should be, reduced to the minimum possible use. Had that statement been made thirty years ago it might have been backed up by reasonable arguments. To-day it comes pretty near to being a malicious fabrication. So many communities at the present time depend also wholly on electricity for artificial lighting and are using energy so economically generated that any considerable reduction in usage would simply be a public hardship. We believe heartily, as every good American should, that in these times there should be careful economy in all things, but to a public dependent so largely as it is upon electric light for its after-dark activities of every kind the singling out of this particular thing for attack seems to show a singular lack of perspective. A first-class central station turns out the kilowatt-hour on two to three pounds of coal, as every well-informed engineer knows, and this amount of energy will supply a dozen 20-cp. incandescent lamps for considerably more than the average evening's use.

It would be hard to point out a place where a small amount of fuel can produce so great a result in usefulness and convenience. Enough coal is wasted daily in the average kitchen range to supply adequate light for the house it serves. If electric light were replaced by gas or oil, the situation would not be bettered in the least, for both require the use of amounts of fuel not to be neglected and more important than the fuel used in the electric light station. If we really want to save fuel—and such saving is unquestionably necessary—the place to begin is not at the point of highly efficient use, but in those things where waste is notorious, like the range, the furnace and the open grate, the last named being the most absurdly inefficient of all heating devices. There is a remarkable lack of breadth of view in the public perception of war-time economies, a frequent and silly endeavor to single out the sensational instead of getting down to bed rock and devoting attention to the important. This straining at gnats and swallowing of camels is surely not what is most needed in the present crisis.

That the strictest economy all along the lines is desirable goes without saying. It is bad judgment to use light or fuel carelessly and lavishly, and economy should be practiced as a personal virtue when the times are such as to demand the full resources of all. We are not in the least worrying about the business of the electric companies. The needs of the war will keep up their output and increase it, but we do lament the foolishness that in its anxiety to save at the tap condones illimitable spilling at the bunghole.

Motor-Driven Planers

THE latest of Professor Clewell's interesting discussions of electric drive deals with the special requirements of planer operations. The planer is one of the most important of machine tools and in some respects the least efficient from the standpoint of output, since at best only half of its motion is taken up in cutting, as opposed to the works of lathes and milling machines. The first requirement, therefore, of a scientific drive is that it should operate on the cutting stroke at the speed of maximum efficiency for the particular metal and the cut in hand, and that it should get back for another stroke in the minimum possible time with as little fuss and strain on the equipment as is practicable.

The actual work required in making the cut is a comparatively small part of the cost of the whole planing operation, so that power economy itself is a less important item here than in many other machines. To meet the requirements of the particular cycle of operation necessary two general schemes are in use. The first of these provides an independent motor drive of the planer, using the ordinary belt equipment and eliminating the line shafting. In this case the motor runs at constant speed and the ordinary belt-shifting device takes care of the varying speed required in the cutting stroke and of the swift return necessary. It is not unusual to accelerate the return by automatic change in the field resistance. The obvious difficulty with the arrangement is the heavy demand for power and the severe strains imposed during the mechanical reversal.

Of late planer manufacturers have been looking with more and more favor on the purely electric drive with reversing motor, using dynamic braking to take up the shock of the necessary reversals. A complete electric drive, of course, gives all manner of opportunity for proper speed variation, at the cost of somewhat more complicated and costly motor equipment. The chief advantage gained is a greater degree of flexibility and the practical abolition of the very severe strains arising from inertia of rotating parts. The inertia of the moving platen is small and that of the rotating parts is relatively very high, causing a corresponding violent effort in reversal. With the dynamic braking possible in the directly driven equipment this difficulty is greatly reduced, and when properly adjusted the direct-driven planer ought to be able to do the work with less wear and tear than if belting were employed with a continuously running motor. The balance of cost in the two cases is not altogether easy to figure out, but experience with other electrical drives would indicate that the increased smoothness and flexibility of control with the reversing-motor equipment is well worth the while

in standardized operations where workmen can be taught to use habitually the most efficient speeds. And in this, as in many other similar cases, it is output which counts as the largest item in successful manufacturing, especially when costs of material and labor are running to exaggerated figures.

Lighting Ships Under Construction

MANY shipyards are now working day and night in the effort to supply the enormous demand for new vessels. This task requires constant and efficient illumination of the construction work by night, illumination not only good enough for ordinary night work but sufficient to insure the effectiveness of the workmen, bringing it up as nearly as may be to a daylight standard. A brief article by William G. Hexamer in the current issue gives some extremely useful hints as to the provisions that must be made for this difficult work.

The objectives to be accomplished may be divided into three separate parts or stages of development—first, provisions for lighting along the permanent ways of a character to meet any reasonable demand for this generalized illumination; second, the lighting of skeleton vessels under construction but not yet ready for anything like a standard temporary system, to meet the requirements of local lighting, and, finally, at a certain stage in the operations a systematic wiring plan must be introduced of so general a character that it can be shifted from ship to ship as one after another leaves the ways and is replaced.

In the example discussed the first requirement is met by regular mains on an ordinary 110-220-volt three-wire system reaching as nearly as may be the full length of the ways, at least down to the water line. This simple installation, with outlets every 20 feet (6 m.) for branches and for reaching a parallel two-wire system on each side of the mains, completes provision for general lighting. There is added, however, a junction box conveniently placed for installing the temporary wiring within the ship. Later as the hull progresses a point is reached where double bottoms and other compartments must receive light to meet the local requirements. For this a ten-outlet plug board is placed at the point of greatest demand, to which portable lamps are attached by 50-foot (15.2-m.) lengths of cable. Finally, when the frame is closed in and the decking in place, mains are stretched on porcelain knobs clamped along the edge of the deck on each side of the vessel. These are fed from the permanent outlet provided and each circuit is subdivided into four by knife switches. Taps are taken from these mains to accommodate plug boards, to which standardized temporary fixtures equipped with 200-watt nitrogen lamps are attached. These furnish a general illumination in the interior of the vessel, while for detail work the portables are retained, the necessary plug boards being installed as the work requires. The mains provided for the permanent ways are utilized for electrical drills and reamers at this stage of construction. It will be seen that this layout is one which fits itself very readily to utilization in ships of various kinds and sizes and gives very flexible provision for the complete lighting of the construction with a minimum of labor as each new keel is laid and the work progresses. It furnishes a capital example of the advantage of systematic methods in accelerating construction.

Intensive Use of Fuel

IN the interest of fuel conservation, attention should again be directed to possibilities of saving through co-operative working between gas and electric companies. This matter has recently been the subject of investigation by the British National Gas Council, with the co-operation of electrical engineers, and some interesting results have been reached. A report is to be laid before the government suggesting, first, that all bituminous coal should be treated for the extraction of its by-products and that gas and electric companies conveniently situated should co-operate through the use of coke as fuel. This is in line with previous studies made in England which have been reported in our columns. The fact is that bituminous coal has constituents which are more valuable from a practical standpoint as gaseous or liquid by-products than they are as mere fuel; and some systematic effort ought to be made to save these incidental values before the coal is thrust into the furnace.

Just at present the fuel supply is so terribly disorganized that the question is not of the orderly utilization of coal but of ability to obtain almost anything that will burn. We recently described the successful use of various low-grade fuels, including even coke breeze, through automatic stokers for raising steam, and boilers gas-fired from coke ovens are already in use. As soon as the situation is cleared up enough to permit an orderly view to be taken, it would be well for the gas and electric companies here to put their heads together with the intention of seeing whether some mutual plan for the better utilization of coal cannot be worked out. Gas and electric companies are no longer, as they used to be, at swords' points, and any vague inherited feeling of distrust ought to be dissipated in view of a common interest in the saving of our fuel supply.

The Coming Issues

NEXT week's issue will contain an article treating of coal conditions as they affect steam electric central stations throughout the country. There will also be published an illustrated article showing how the United States can effectively aid France and thereby conserve our coal and ships by rapidly developing her water powers in true American fashion. Commencing with this issue, we will devote additional space to technical subjects falling in the gap between pure science and applied engineering. These will include investigations of the suitability of different apparatus to operate under different conditions, results of studies which may lead to developments in apparatus or equipment, studies of purely engineering problems with a view to their solution, the evolution of principles which may change present operating methods, etc. Reading pages will be added to care for this extra material.

New England Coal Situation Very Serious

Economy in the Use of Fuel and Increased Efforts to Obtain a Supply Now Matters of Government Concern—Widespread Publicity by Fuel Administrator's Office in the Interest of Coal Conservation

BY JAMES J. STORROW
New England Fuel Administrator

WITH a shortage of 7,801,570 tons of bituminous coal on Jan. 1, 1918, New England faced one of the most critical situations industrially that have arisen anywhere on this continent since the outbreak of the world war.

The railroad congestion now has reduced the car supply for commercial coal at the Pennsylvania mines, bringing New England less than 20 per cent of its contract requirements, with no coal whatever for hundreds of New England plants which depend upon buying spot coal in the market. The taking of tugs and ships for governmental purposes has also greatly reduced the supply of coal moving by water from the West Virginia mines to Boston, Providence, Portland and other New England coal-distributing ports. Unless immediate and effective action is taken by the government within a few days to increase the movement of coal to New England, many hundreds of millions of war equipment which the government is expecting New England to produce will not be produced. Many people do not realize that, even though we are at war, many million tons of coal must be burned for purposes which come ahead even of rifles, cartridges and poison gas.

Enormous Coal Consumption of New England

In the first place, it takes over 13,000,000 tons of coal a year to keep the houses of New England warm and cook the daily food of the inmates. It takes over 6,000,000 tons to keep the New England railroads running. It requires many millions of tons for the trolley lines, without the operation of which employees cannot get to the great Fore River shipbuilding plant and the rest of New England's industrial establishments. Moreover, the gas and electric light plants, which burn millions of tons, must be kept going. It was 30 deg. below zero in northern New England on the morning of Dec. 29.

There is one New England company alone which has undertaken to turn out 3,500,000 yd. (3,200,000 m.) of shirting for our soldiers, 3,500,000 yd. (3,200,000 m.) of khaki, 4,000,000 yd. (3,650,000 m.) of cloth to make overcoats, and 3,500,000 yd. (3,200,000 m.) of blankets. This is merely one illustration.

The New England Fuel Administrator visited Washington on Dec. 29 and conferred with Dr. Garfield, Chairman Hurley of the Shipping Board and Secretary of War Baker. The New England crisis will receive very careful consideration from these officials, with a view to finding a prompt and effective remedy. It is expected that the situation will also be taken up with Secretary McAdoo and his advice and assistance sought, but at this writing it is impossible to state the exact steps which the government will take.

The total consumption of bituminous coal in New England in 1916 was 27,145,752 tons. An estimated increase of 20 per cent in 1917 is probably low for soft coal, as the New England industries are working under the most intensive pressure ever known and probably to a greater extent than any other section of the country, except perhaps the steel-making districts. Normally New England carries two-thirds of its soft coal by water and one-third by rail. Owing to war conditions, many of the New England coal-carrying bottoms have gone off the coast and cannot be replaced. The already overloaded New England railroads can assume few if any additional burdens. Winter storms and cold weather easily cut down the capacity of these railroads by at least 25 per cent, and the same cut applies to the coal-carrying fleet in winter weather. New England's problem is quite as much one of transportation as of securing coal. It is likely that the shortage will grow worse owing to lack of transportation facilities, and the importance of every possible economy in the use of fuel cannot be exaggerated.

By long custom of the trade, New England has been pre-eminently a spot coal market. The mines have been glad to sell their coal for cash to New England consumers during the summer months while other localities were less ready to buy coal. New England consumers have learned the necessity of accumulating a supply of coal during the summer, owing to the inability of rail and water transportation facilities to carry coal as fast as it must be burned during the winter. Owing to its greater distance from the mines, New England is considered a less desirable market, and at times consumers have been obliged to bid higher prices than other localities in order to divert coal in their direction.

Acute Situation in Spot Coal

The situation in New England in regard to spot coal became acute as soon as the tentative maximum price of $3 was put into effect by the coal production committee, because New England consumers were prevented from bidding higher than other localities for the coal they needed and the mines and originating railroads at the same price preferred to improve their inadequate car supply by selling coal nearer the mines and so getting their cars back sooner. Now that the two-dollar price is in effect, the situation has grown no better, to say the least. A very large number of New England manufacturers who are dependent upon buying spot coal for their own use have been completely shut off. Most of the coal is going to fill contracts at higher prices, and if there is any surplus of free coal it is being sold nearer the mines. New England today cannot buy a carload of spot coal.

A general response has been received to the requests of the Fuel Administrator's office on behalf of coal conservation, as well as to the orders of the federal

administration. A large amount of publicity material has been prepared and spread broadcast in New England, ranging from suggestions toward the reduction of fuel waste in the home to the publishing of instructions bearing upon improved firing in the industrial and public utility boiler room. The war aspect

THIS REPORT SHOULD BE MADE IN DUPLICATE AND BOTH COPIES RETURNED WITHIN 5 DAYS TO

U. S. FUEL ADMINISTRATOR FOR NEW ENGLAND
STATE HOUSE, BOSTON, MASS.

STEAM PLANT DATA

Name of company ..... Address .....

Name of plant ..... Location .....
(Make out a report for each plant. Extra blanks will be supplied on request.)

Average hours per day plant is operated .....

Kind of coal used ..... Average daily consumption of coal .....
(In pounds)

1. Number of boilers and horse power of each .....
(State whether water or fire tube)

a. Natural or forced draft .....

b. Normal steam pressure carried ..... Maximum variation .....

c. Are boilers equipped with automatic damper regulator? .....

d. Are all blow-off connections tight and free from leaks? .....

2. State average temperature of feed water entering boilers { Observed / Estimated }

a. Are pumps or injectors used to put water in boilers? .....

b. Do you use an open or closed feed water heater? .....

3. Number of engines and horse power of each .....
(State whether simple or compound; condensing or non-condensing)

a. What method of transmission? .....
(State whether mechanical or electrical)

4. State other purposes and pressures for which steam is used .....
(Such as heating buildings or water, cooking, pumps and process work)

5. Is exhaust steam from engines used in whole or in part? .....

a. State service .....

b. Do you have a surplus? .....

6. Is all steam used under questions 4 and 5 supplied with a suitable steam trap? .....

a. Are steam traps known to be in good working order? .....

b. How many steam traps return the condensation directly or indirectly to the boilers? .....

c. How many steam traps discharge the condensation to waste? .....
(Give size and service connected.)

d. Are any return pipes connected to waste manually controlled? .....

7. Is steam used from open end pipes? .....
(State purpose, and whether or not a trap could be used)

8. Are all steam pipes properly insulated? .....

9. What changes have you in progress which are expected to reduce your fuel consumption? .....
(Give expected date of completion and estimated saving.)

QUESTIONNAIRE OF NEW ENGLAND FUEL ADMINISTRATION

of fuel saving has been constantly emphasized, and the part each individual can play has been set forth clearly. The public in general is certainly beginning to realize the value of economies on a small scale no less than on a large one.

Central stations have displayed a keen appreciation of the situation and have refrained from taking on a large amount of "non-essential" power business which in normal times would be welcomed with open arms. Realizing the economy in fuel to be derived from the installation of central-station service in a great number of cases, owners of private power plants throughout Massachusetts have been asked by the New England Fuel Administrator to consider the economic possibilities of buying power under favorable conditions, and within a few days a report form has been sent to steam plants, to be returned to the Fuel Administrator's office at the State House, Boston, covering the essential data from which the possibility of more economical use of fuel may be determined.*

This form includes such points as the daily hours of plant service, kind of coal, amount of fuel used, description of boilers, data bearing upon steam pressure, feed-water supply, conditions of piping, blow-off connections, leaks existing, uses of output, type and number of engines, size of generating units, use of exhaust steam, condition of traps, and surplus power available.

The office of the Fuel Administrator is co-operating with fuel users in every feasible way to help them obtain service at greater efficiency and reduced coal consumption, and has offered to assist in engineering analyses of plant conditions with respect in particular to determining the desirability of installing central-station service or effecting other improvements in the coal consumption of steam plants. The so-called "lightless nights" ordered by the federal government are being observed with more and more care, and it is not too much to say that New England is making the most vigorous effort to help herself while seeking the aid of the federal government in order that her industrial life may continue to render the utmost patriotic service in this time of the nation's necessity.

Maximum Load of Commonwealth Edison

The maximum load of this winter, and also in its whole history, for the Commonwealth Edison Company of Chicago occurred at 5 p. m. on Dec. 28, when a total of 410,910 kw. was observed on station meters. Integrated over the half-hour period between 5 p. m. and 5.30 p. m., this amounted to 397,144 kw. Of this, 4814 kw. was used by generating stations for their own power requirements. This amount, together with that consumed in about fifty substations, places the Edison company in the ranks of the largest consumers of its power. The kilowatt-hour output on this day was 5,428,634 kw.-hr., slightly lower than a previous high output, which occurred on Dec. 13 and up to the present constitutes the largest output in the history of the company—5,456,758 kw.-hr. The railway load, as usual, is the predominating factor, amounting to 218,320 kw., while the total Edison load amounted to 176,794 kw. Of the Edison load, on an integrated basis, about 110,000 kw. was 60-cycle, while the direct-current light and power amounted to about 62,000 kw. At the time this maximum occurred the company had a total rated reserve generating capacity of 61,000 kw. in batteries and in reserve steam plants.

*In some quarters the purpose of asking isolated plants to consider the economy of buying power was misunderstood and the Fuel Administrator was charged with issuing central-station propaganda. Absolutely no such intention existed, the sole object being to encourage every possible fuel saving.—EDITOR.

Long Spans Permitted by Steel Wires a Saving

Practice Followed by Some Pacific Coast Companies in the Substitution of Steel for Copper Has Been Found of Material Advantage—Summary of San Diego Companies' Specifications

BY L. M. KLAUBER

San Diego Consolidated Gas & Electric Company

THE savings which may be effected by the use of steel in the place of copper in lines of moderate length and load warrant careful consideration of the cheaper metal. Steel conductors not only effect a saving due to reduced cost per unit of length, but also, owing to greater tensile strength and reliability, permit wider spacings in supports. Poles, cross-arms, insulators and line hardware have all advanced greatly in price and are often difficult to obtain at any price, and the reduction in the cost of supporting structures by the use of steel is as important as the saving in the conductor itself.

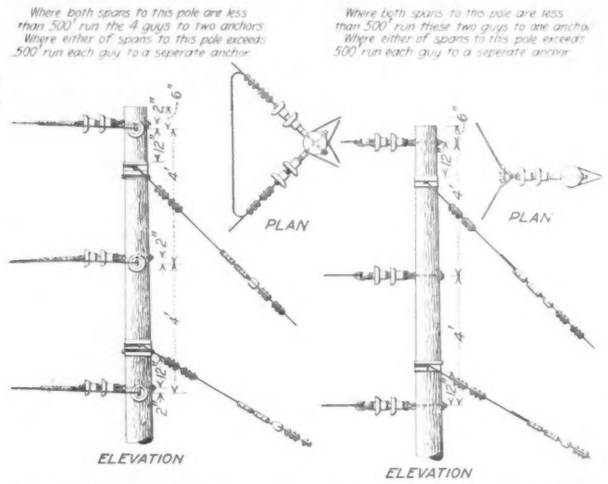
Where both spans to this pole are less than 500' run the 4 guys to two anchors. Where either of spans to this pole exceeds 500' run each guy to a seperate anchor.
PLAN
ELEVATION
Where both spans to this pole are less than 500' run these two guys to one anchor. Where either of spans to this pole exceeds 500' run each guy to a seperate anchor.
PLAN
ELEVATION

FIG. 1—CONSTRUCTION EMPLOYED FOR 70-DEG. TO 110-DEG. ANGLES AND FOR 0 TO 70-DEG. OR 110 TO 160-DEG. ANGLES

The Pacific Coast companies have for some time past used comparatively long pole spacings with copper conductors and wood-pole lines. Standard spans of 350 ft. (106.7 m.) with No. 6 or No. 4 solid, or 450 ft. (137.2 m.) with No. 2 or No. 1 stranded medium hard-drawn bare-copper conductors, have been used extensively without the slightest difficulty.

With the advent of steel conductors it was seen at once that these spans could be greatly exceeded with absolute safety. After several branches were put in by the San Diego Consolidated Gas & Electric Company, using ¼-in. (6.3-mm.) standard steel and 550-ft. (167.6-m.) spans, 700 ft. (213.4 m.) was selected as a standard, and many miles of line have been built with spans of this length. Naturally, large sags were necessary with these spans. Although flat construction had always been used in distribution circuits employing copper conductors, the old-style triangular construction, with a pole-top pin, was adopted, with steel to give greater clearances between conductors.

The use of steel conductors and long spans introduces no difficulties. With the greater strains experienced, guying at corners must receive careful consideration. As a rule stubs must be specially heavy and anchored. Anchor guys must be used in quantity; at sharp corners four and six anchors to the pole are occasionally required.

The San Diego Consolidated Gas & Electric Company has now installed in main or branch lines exceeding a mile in length 68.6 circuit miles (201.3 wire miles) of steel conductors of ¼-in., 5/16-in. or ⅜-in. standard steel. In addition there are 25 miles (75 wire miles) under construction. Also there are 52.5 wire miles of ¼-in. steel in constant-current series circuits. Most of the constant-potential circuits are 11 kv., although a few are 2300 volts.

A brief summary of the specifications used in a recent 11-mile (17.7-km.) extension of an 11-kv. line follows:

Conductor.—⅜-in. extra-galvanized, standard steel, seven-strand.

Spans.—700 ft. Vary as dictated by topography of country, taking advantage of knolls and hill tops. Spans not to be shortened at corners. Maximum single-pole spans to be 1000 ft.; terminate spans exceeding 1000 ft. on double pole structures. In spans exceeding 1500 ft. use high-strength steel. Shorten spans to 200 ft. where possible in crossing railroads, main highways and telephone toll leads.

Clearances.—Minimum clearances over railroads, 28 ft.; over traveled highways, 24 ft.; over other supply lines or communication lines, 6 ft.

Poles.—Class A Western red cedar with open-tank

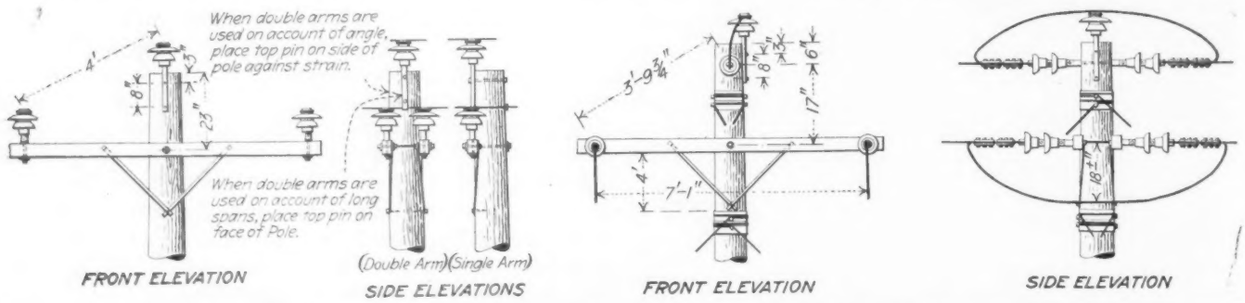
When double arms are used on account of angle, place top pin on side of pole against strain.
When double arms are used on account of long spans, place top pin on face of Pole.
FRONT ELEVATION
(Double Arm)(Single Arm)
SIDE ELEVATIONS
FRONT ELEVATION
SIDE ELEVATION

FIG. 2—CONSTRUCTION EMPLOYED IN SPANS NOT EXCEEDING 1000 FT., OR 175-DEG. TO 180-DEG. ANGLES (USE DOUBLE ARMS AT ALL ANGLES, CROSSINGS, AND FOR SPANS 500 FT. OR LONGER) AND FOR DEAD-END POINTS, OR 160-DEG. TO 175-DEG. ANGLES (IN TANGENTS OVER ONE MILE IN LENGTH USE ONE PER MILE)

treated butts. Standard pole on tangents, 40 ft.; at corners, 45 ft. Other lengths as required by topography. Set at N. E. L. A. standard depths. All poles to be shaved and gained at pole yard.

Wire Arrangement.—Triangular with vertical corners.

Transpositions.—Six-mile barrels unless by special agreement with communication companies.

Cross-Arms.—3½-in. by 4½-in. by 8-ft. Douglass fir, painted with two coats of yellow cement paint.

Braces.—28-in. galvanized N. E. L. A. standard.

Pins.—St. Louis Malleable Casting Company No. 435 R galvanized with felt insertion.

Pole-Top Pins.—Hubbard No. 3020.

Insulators.—Ohio Brass No. 12546 or Locke No. 5155 (27,000 volts).

Strain Insulators.—Locke No. 3039 in pairs. A complete dead-end consists of one spring clevis, two No. 3039 strain insulators, ⅜-in. galvanized thimble and two three-bolt guy clamps.

Tie Wire.—Galvanized steel. Use one strand of the ⅜-in. conductor 48 in. long. Use a double back tie.

Splices.—Splice with five three-bolt guy clamps and two ⅜-in. thimbles. No solder.

Guys.—⅜-in. extra-galvanized standard steel, same as conductor. Use double sets of three-bolt guy clamps.

Guy Insulators.—White's No. 506. Use one strain insulator in each guy, 4 ft. to 8 ft. from the pole. Also in the lower ends of guys attached to stubs not anchored.

Anchors.—Use pyramidal concrete anchors except in marshy ground, where treated wood slugs must be used. Where spans adjacent to corners exceed 500 ft. use pairs of anchors. Anchor stub guys in soft ground or where stub holds a corner adjacent to a span exceeding 500 ft. Anchor rods to be standard ¾-in. galvanized, 8 ft. long. Use anchor boxes where required for the protection of persons.

Stubs.—Stubs to be Western red cedar poles 16 ft. 9 in. to 19 ft. 6 in. in length. Minimum top, 28 in.; minimum circumference 6 ft. from butt, 34 in.

Switches.—Line switches, Pacific Electric No. 1420; transformer switches, Pacific Electric No. 422-F.

Hardware.—All bolts, clamps, lag screws and miscellaneous hardware to be galvanized in accordance with N. E. L. A. specifications.

Special Foundations.—Set poles in concrete at heavy marshes. Use trussed pole set in concrete or push brace where anchors cannot be placed.

Operating Characteristics of Motor-Driven Planers

Relative Merits of Non-Reversing and Reversing Motor Equipment for Planers—Emphasis Is Placed on the Method of Control Required Because of the Peculiar Character of the Duty Cycle

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SYNOPSIS.—This article contains an analysis of the duty cycle of the planer and a discussion of the requirements of the driving equipment. The non-reversing motor is described and compared with the reversing equipment. Special emphasis is placed upon the method of control which is required. Incidental items, like the reduced flywheel effect due to the absence of pulleys with the reversing motor, the advantages of dynamic braking, remote control and the automatic action of the master switch in connection with the controller are also treated at some length. Economic advantages are set forth which may result directly from a careful study of cutting speeds and the speeds of the return strokes, increasing the ratio of the latter to the former, eliminating the time losses from belt slip at the points of reversal and the like.

THE duty cycle of the planer possesses peculiar characteristics which must be taken into consideration when selecting a driving motor and the control apparatus. Obviously, the speed of the platen on its return stroke when no cut is being made can be greater than its speed during the cutting stroke when the metal is being removed by the stationary cutting tool. In fact, the speed during the cutting stroke should be adapted to the most economical cutting speed from the standpoint of the cutting tool, the strength of the machine itself and similar items of the same general nature which govern the most economical speeds for lathes and other metal-working machinery. Hence, to increase as much as possible the amount of metal which may be removed during a day it is important to reduce the time of the reverse or return stroke by increasing the speed of the platen for this part of the cycle to as high a value as the machine tool will economically stand. This results in two different driving speeds for each cycle.

Moreover, it is essential for the economical operation of the planer that the time consumed in making the reversal at the end of each stroke be as small as possible. Hence the motion of the planer must be stopped as quickly as possible at the end of each stroke and accelerated promptly in the reverse direction.

From these elements of the duty cycle it follows that the motor is required to pass through two starting periods for each cycle and that it should be capable of operating at two different speeds for the two strokes. The points at which economy may be effected are in maintaining the most economical cutting speed for each class of material worked upon and for each depth of cut and feed, to brake the equipment quickly at the end of each stroke, to accelerate it promptly and quickly in the reverse direction, and to maintain throughout the return stroke as high a speed as is consistent with the operation of the planer.

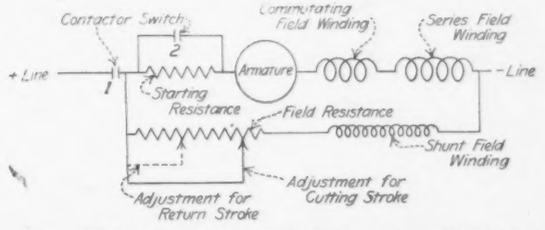


FIG. 1—A METHOD OF CONTROLLING NON-REVERSING PLANER WHICH APPLIES FOR REVERSING EQUIPMENT IF A REVERSING SWITCH IS ADDED AND PROVISION MADE FOR DYNAMIC BRAKING

BELT DRIVE CONVENIENT IN ELECTRIFYING LINE-SHAFT EQUIPMENT

Belted motor drive, sometimes termed the "non-reversing" motor equipment, for planers possesses a number of interesting features which will be made the basis for comparison later with the "reversing" motor

equipment. In an arrangement of this kind (Fig. 4A) the chief advantage of the motor drive is that the speed of the motor may be adjusted independently for the forward or cutting stroke as well as for that of the reverse stroke, thus placing the most economical operating speeds at the convenient disposal of the operator.

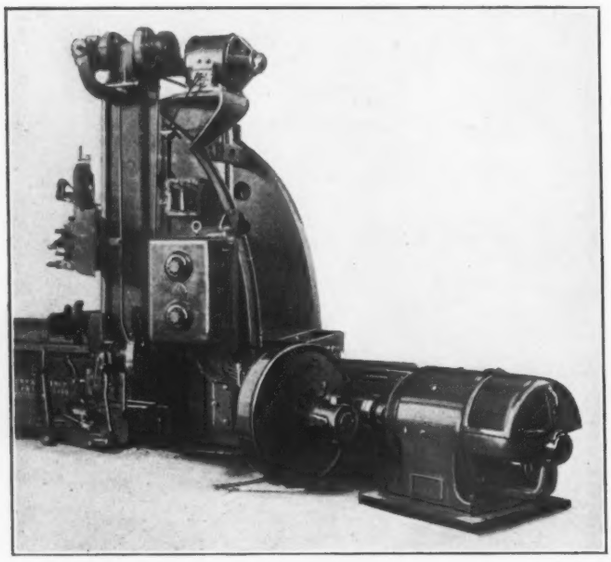


FIG. 2—A 48-IN. BY 48-IN. PLANER DRIVEN BY A 20-HP., FOUR-TO-ONE ADJUSTABLE SPEED-REVERSING MOTOR (CONTROLLER ON PLANER FRAME)

Incidentally, this type of equipment can readily be applied to planers already in operation at relatively small expense and with little or no change in the arrangements in the shop. Moreover, the use of belts and pulleys makes it possible to use a higher speed motor and one with a lower speed range than in those cases where a reversing motor is directly coupled to the machine.

The usual procedure with this equipment is to start the motor either by a hand-operated starting rheostat or by an automatic magnetic starter controlled by a pendent switch in the hand of the operator. The motor then runs continuously in one given direction, whereas the platen is reversed at the end of each stroke by the usual tight and loose pulleys and belts (Fig. 4A). To obtain the two distinct speeds for the cutting and return strokes two field rheostats are used in the controller, connected in parallel with the field, but so connected to the master switch that only one is in the field circuit at a time.

A master switch (Fig. 4D) is usually attached to the side of the planer to insure that only one field rheostat will be in the field circuit during the cutting stroke. At the end of the cutting stroke a trip on the side of the moving platen operates the switch, thus connecting the other rheostat in the field circuit automatically.

A simplified diagram of connections for such an arrangement is indicated in Fig. 1. While this diagram relates primarily to the non-reversing equipment, it applies equally well with slight modifications to the reversing equipment, which is also described here.

The foregoing notes indicate that the non-reversing equipment is merely one step from the straight line-shaft drive toward the ideal individual motor application. The non-reversing motor affords the distinct advantage of independent control of speed for the two strokes, but the reversal itself as well as bringing the platen to rest are functions of the belts and pulleys. In bringing the platen to rest by change of belts not only must the inertia of the platen itself be overcome but also the flywheel effect of the pulleys. Moreover, to reverse the motion by a belt introduces slippage, which obviously causes a time loss in the interval of reversing, sometimes as much as 10 per cent of the duty cycle.

ADVANTAGES AND DISADVANTAGES OF NON-REVERSING MOTORS

The reversing motor equipment, as its name implies, provides in the motor equipment the function of reversal plus all of the elements of the non-reversing equipment and the facilities of dynamic braking, thus meeting practically all of the requirements of an ideal individual motor drive. Being directly connected to the planer, the speed range of a reversing motor is necessarily greater than in the non-reversing type, being four to one ordinarily in the former and two to one in standard types of the latter.

The controller equipment, which is similar in form to that used with the non-reversing motor (Fig. 1), must have in addition a switch for reversing the direction of rotation and also the connections and equipment required for dynamic braking. The wider speed range of the reversing motor, the lower value of the maximum speed and the additional elements in the control all tend to increase the first cost of this type in comparison with the non-reversing type.

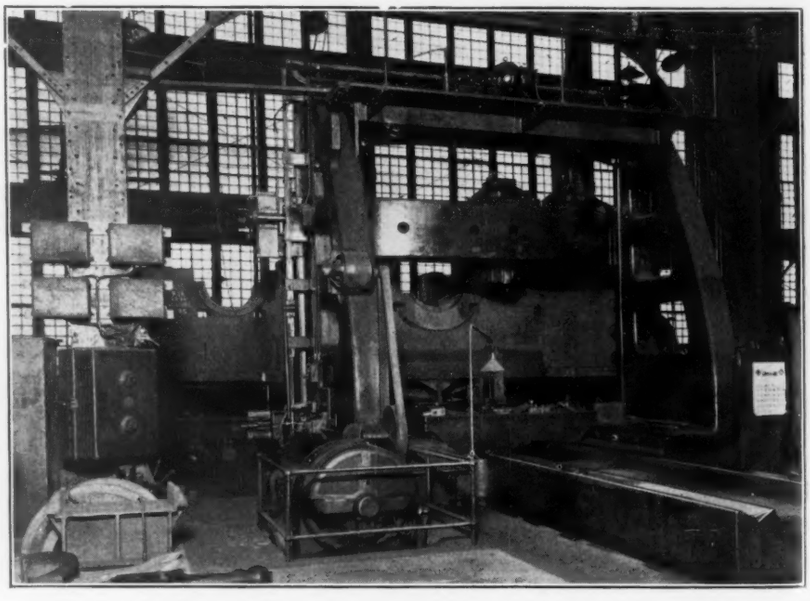


FIG. 3—A 14-FT. BY 30-FT. PLANER EQUIPPED WITH A 75-HP., FOUR-TO-ONE ADJUSTABLE-SPEED REVERSING MOTOR (CONTROLLER ON NEARBY COLUMN)

From the standpoint of economy, the reversing motor eliminates the belts and pulleys, thus avoiding belt

slip, and the dynamic brake makes it possible to stop the planer before reversal in a more satisfactory manner than by some of the other methods. In one test a planer which was stopped in twenty-four seconds by friction alone was brought to standstill in two and one-half seconds by dynamic braking.

It is perhaps not usually recognized that the advantages of the dynamic brake rest not solely on quickness of stopping, but also on the elimination of brake-shoe wear and on the ability to begin the braking period with less braking action than is effective later on. In other words, this scheme makes it possible to graduate the mechanical braking forces and to avoid the shock to the system which may result from braking in one step from high speed.

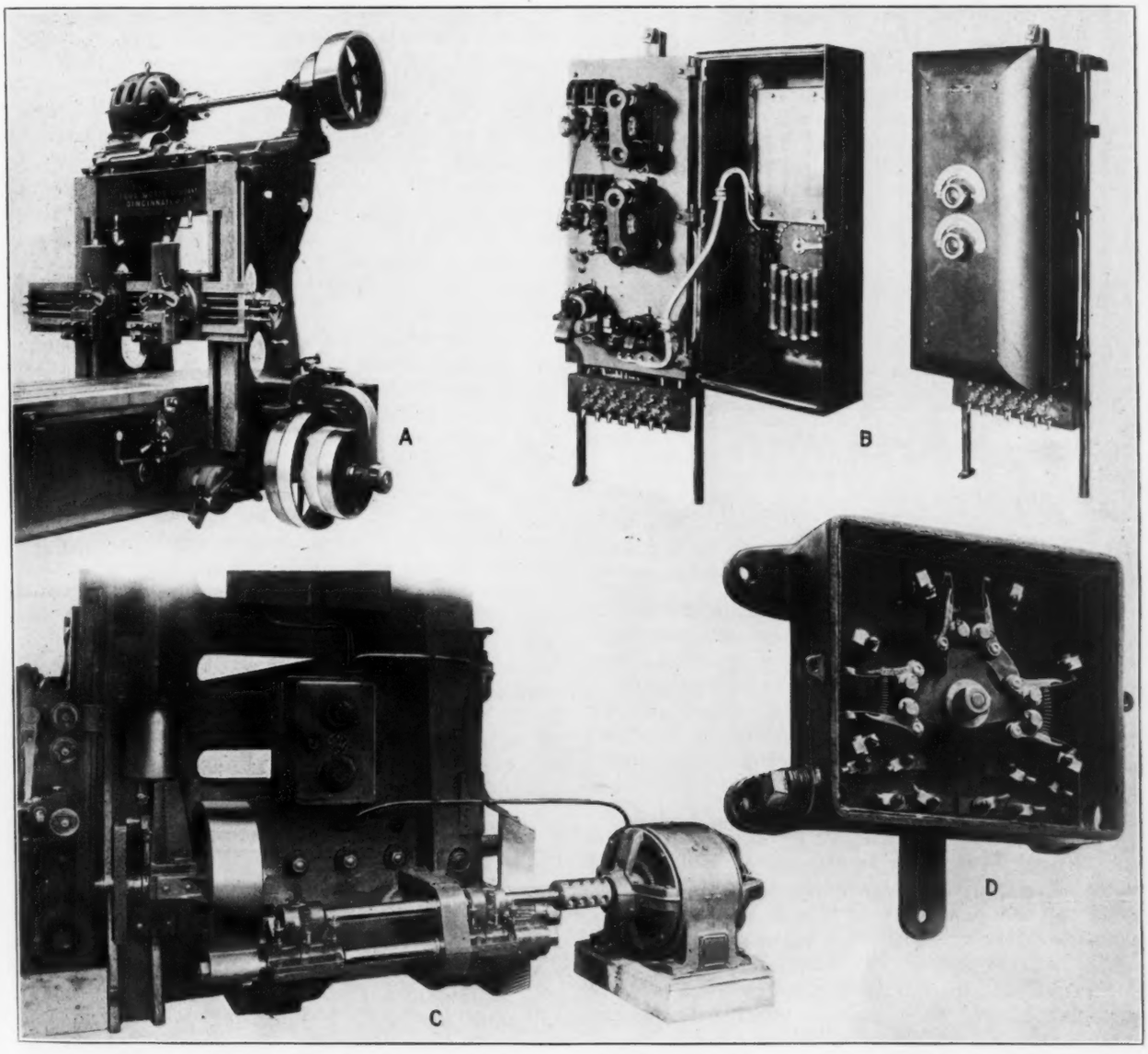


FIG. 4—APPLICATIONS OF MOTORS TO PLANERS AND TWO TYPES OF CONTROL APPARATUS

A—Motor-driven planer with belted connection. B—One type of controller employed for reversing motor. C—Method of connecting motor to planer. D—Master switch for use with non-reversing motors

FLYWHEEL EFFECT VS. PLATEN INERTIA

Interesting figures are available to show the flywheel effect of pulleys and of the revolving armatures of motors in comparison with the inertia of the platen of a planer. A. G. Popcke has shown, for example, that the inertia of a 15,000-lb. (6803.8-kg.) planer platen when moving at a speed of 100 ft. (30.5 m.) per minute has about one-twenty-fifth of the inertia of a 35-hp. motor running at 1000 r.p.m. This gives an excellent idea of the enormous flywheel effects which may be introduced into the mechanical system of a planer by motor drive and why the absence of pulleys resulting from the use of reversing motors may reduce the inertia of the moving system as a whole, and particularly so if the motor has a relatively small diameter rotor. In this connection Popcke shows that a reduction of 5 in. (12.7 cm.) in a motor-armature diameter of 19 in. (48.3 cm.) may reduce the inertia or flywheel effect nearly 100 per cent.

Push-button or pendent switches, from which the motors may be started or stopped, are especially desirable if placed in convenient locations, as they save time and relieve the motor and driven mechanism of the strains that might be caused by manual starting, etc.

In one of the ordinary types of planer motor control, for instance, a relay short-circuits the field rheostat and thus permits full field current as long as the armature current is above some given value. As soon as the current drops below the given value the relay again

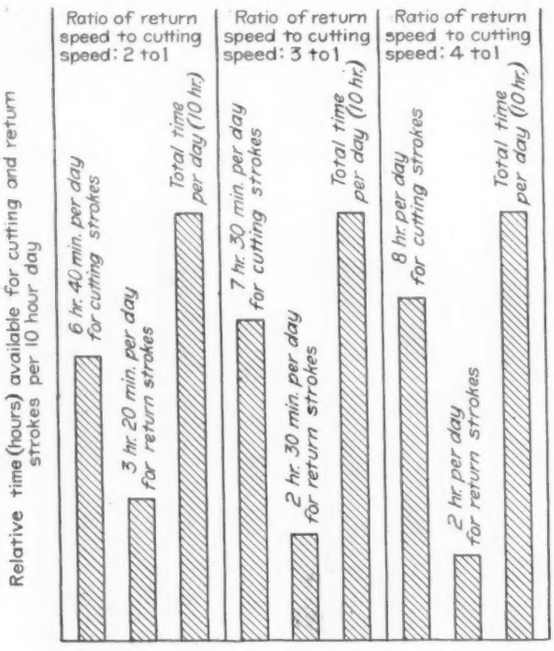

Relative time (hours) available for cutting and return strokes per 10 hour day
Ratio of return speed to cutting speed: 2 to 1
6 hr. 40 min. per day for cutting strokes
3 hr. 20 min. per day for return strokes
Total time per day (10 hr.)
Ratio of return speed to cutting speed: 3 to 1
7 hr. 30 min. per day for cutting strokes
2 hr. 30 min. per day for return strokes
Total time per day (10 hr.)
Ratio of return speed to cutting speed: 4 to 1
8 hr. per day for cutting strokes
2 hr. per day for return strokes
Total time per day (10 hr.)

FIG. 5—INCREASED TIME AVAILABLE FOR CUTTING WHEN RATIO OF RETURN SPEED TO CUTTING SPEED IS INCREASED

inserts the field rheostat corresponding to normal speed for the given stroke.

Points of Economy in Methods of Drive

While the advantages of the two principal methods of motor drive for the planer, just outlined, are fairly obvious, the substitution of either type for the line-shaft drive must necessarily rest on cost factors or on the points of economy in favor of the motor in contrast to the shaft-driven tool. The items which constitute the operating expense for the average planer are given* in the table.

In this the item "miscellaneous expense" includes general repairs, storage, haulage, tool-room charges and interest and depreciation on the cost of buildings and auxiliary apparatus, such as cranes, lights and the like, which are chargeable in part to each machine tool. A study of this table shows that the machine-hour cost rating will not vary to any considerable extent with the output, and hence it takes the form of a more or less fixed charge, which goes on whether the output is large or small.

Hence, if the motor drive is capable of increasing the output from a given planer per unit of available time per day for productive work, in comparison with the line-shaft-driven planer with the same labor expense, this then constitutes a fundamental and most important economic advantage for the motor-driven tool. This is apparent when it is considered that a larger output for each possible machine hour per day not only reduces the labor charge but also the overhead expense which must be assigned to the given operation.

The power for driving such a machine tool per hour may be seen to be a very small relative item even for the larger planers. Any saving in power per hour of operation has, however, an appreciable although small effect on the aggregate hourly cost and should hence be duly considered. Tests on belt-driven planers and reversing motor-driven planers, conducted over a considerable time interval so as to give average values, indicate that the energy consumption per hour may be as much as 25 per cent greater for the former than the latter. One reason for this is that the reversing motor is shut down between operations and at the times of making necessary adjustments in the work, and hence the power consumed will naturally be less than in those cases where belt and shafting losses continue during these intervals. The elimination of line shafting and belting removes the necessity of belt maintenance, repairs and belt renewals and also saves the time required for this upkeep work. Cases have been reported where such upkeep work has amounted to as much as from $100 to $500 per annum per planer.

Added to these items there are the economies which result from increasing the cutting speed. Where the belted planer does not possess the required speed changes for giving this most economical speed for given operations, the increased flexibility of the motor control can be made to yield much improved results. Similarly, the ratio of the return stroke speed to the cutting speed may have a considerable bearing on the output. Thus if the most economical cutting speed is obtainable and is used, quite a change may be made in the amount of time available per day for the cutting strokes by increasing the ratio of the return speed to the cutting speed as shown in Fig. 6.

Other advantages of direct-connected motors are the elimination of belt slippage and quick braking made possible by reducing the flywheel effect of the rotating elements. Time may also be saved by the facility with which adjustments may be made in setting up the work by the accurate and convenient control which is afforded in the motor equipment.

When it is not clear that the added investment for a reversing motor or even a non-reversing motor equipment is warranted, it is well to test out the results with graphic instruments and to base the comparison on exact rather than generalized data. The fact that machine-tool builders tend to the adoption of motor drive for new machines, at least for the larger planers, is an indication that its advantages for this class of apparatus are beginning to be recognized by the trade.

ITEMIZED LIST OF OPERATING EXPENSES FOR TYPICAL PLANERS

Size of Planer	Interest and Depreciation on the Cost of the Planer	Cost of Power (Cents per Kw.-Hr.)	Miscellaneous Expense	Supervision and Clerical Work	Total Machine Hour Rate
36 in.	$0.04	2	$0.49	$0.25	$0.80
48 in.	0.12	2	0.59	0.30	1.03
56 in.	0.09	4	0.69	0.35	1.17
60 in.	0.18	4	0.70	0.35	1.27
130 in.	0.22	6	2.68	1.35	4.29
7 ft.	0.19	4	1.05	0.53	1.81
10 ft.	0.28	4	1.26	0.64	2.22
10 ft. (heavy)	0.82	6	2.04	1.13	4.05
14 ft.	0.60	6	2.79	1.42	4.87
14 ft. (heavy)	0.97	6	3.89	2.14	7.06

*The table is based on data of the Westinghouse Electric & Manufacturing Company. See also "Handbook of Machine Shop Electricity," by C. E. Clewell, McGraw-Hill Book Company, pp. 430-432.

Design of Rotor Cores for Electrical Machines

Development of Formulas for Figuring Stresses in High-Speed Rotor-Core Punchings —Chart Which Makes Computation Simple—Determining Stresses in Bored and Solid Disks

BY WILLIAM KNIGHT

THE object of this paper is to develop a formula for figuring stresses in core punchings of high-speed rotors due to the centrifugal force of the rotor coils held in slots at the periphery of the core and also to the centrifugal force of the punchings themselves. Both the case of punchings with a hole at the center and that of solid punchings (no hole at the center) will be considered. In the case of punchings with a central hole for mounting on a shaft or a spider the force-fit needed at the bore to assure proper operation at the maximum speed for which the machine is designed will be given.

The following symbols will be used in the calculation:

σ_r and σ_t = radial and tangential stresses at any point of a rotating thin-steel disk of uniform thickness due to the centrifugal force of its own mass and the centrifugal force of projecting masses attached at the periphery.

σ_r' and σ_t' = radial and tangential stresses at any point of a rotating thin-steel disk of uniform thickness due to the centrifugal force of its own mass only.

σ_r'' and σ_t'' = radial and tangential stress at any point of a rotating thin-steel disk of uniform thickness due to the centrifugal force of projecting masses attached at the periphery.

T = tangential stress of a thin-steel ring rotating at the same speed as the peripheral speed of the disk.

F = centrifugal force of projecting masses per square inch of outer surface of the disk.

R = outside radius of disk.

r = radius at the bore of the disk.

x = radius at any point.

E = modulus of elasticity of material = 30,000,000.

v = Poisson's ratio, for steel = 0.3.

N = revolutions per minute at the maximum speed.

In "Steam Turbines" Dr. Stodola gives the two following general equations for disks:

$$\sigma_r = \frac{E}{1-v^2}[(3+v)ax^2 + (\psi_1+v)b_1x^{\psi_1-1} + (\psi_2+v)b_2x^{\psi_2-1}] \quad (1)$$

$$\sigma_t = \frac{E}{1-v^2}[(1+3v)ax^2 + (1+\psi_1 v)b_1x^{\psi_1-1} + (1+\psi_2 v)b_2x^{\psi_2-1}] \quad (2)$$

where, in the case of a disk of uniform thickness, $\psi_1 = 1$; $\psi_2 = -1$; $a = -3 \times 10^{-4} \times N^2$, and b_1 and b_2 are two constants depending on the outline of the disk and on the presence or absence of other forces acting on the disk besides the centrifugal force of its own mass. In this case the additional force is due to projecting masses attached at the periphery.

The two constants b_1 and b_2 may be determined for the particular case under consideration and the two formulas then expressed in such a form that anybody who is not familiar with elaborate mathematical manipulation can use them, thus saving time and eliminating chances of making errors.

Letting R equal the radius of the punchings at the bottom of the slot for the time being, $m = x/R$ and $m_o = r/R$.

Calling W the weight of the length of coils and insulation carried in the slots, and R' the radius of the center of gravity of this weight, n the number of punchings in the core and t the thickness, the centrifugal force of the projecting masses per square inch of outer surface of the disk will be: $F = (0.000341 \times WR'N^2)/2\pi Rnt$. Also, the tangential stress of a thin-steel ring of radius R and rotating at the speed of N revolutions per minute is: $T = 8 \times 10^{-6} \times R^2N^2$.

After making the necessary substitutions in formula (1),

$$\sigma_r = -0.408Tm^2 + 43 \times 10^6 b_1 - (23.1 \times 10^6 b_2)/R^2m^2.$$

To simplify the development of a readily usable formula it will be assumed that at N revolutions per minute the bore of the punchings will have expanded an amount equal to the initial difference in the diameters of the shaft, or spider, and punchings bore. Thus the initial radial pressure at the bore produced by the force-fit is zero at N r.p.m.

At the outside radius of the punchings the radial stress at N r.p.m. is evidently F. At the bore $m = m_o$ and at the periphery $m = 1$. Substituting in the preceding formula for σ_r,

$O = -0.408Tm_o^2 + 43 \times 10^6 b_1 - (23.1 \times 10^6 b_2)/R^2m_o^2$ at the bore.

$F = -0.408T + 43 \times 10^6 b_1 - (23.1 \times 10^6 b_2)/R^2$ at the periphery.

From these equations the two unknown values b_1 and b_2 can be derived and substituted in formulas (1) and (2), giving when simplified:

$$\sigma_r = T[0.408(1 + m_o^2 - m^2 - (m_o^2/m^2))] + F\frac{1-(m_o^2/m^2)}{1-m_o^2} \quad (3)$$

$$\sigma_t = T[0.408(1 + m_o^2 + (m_o^2/m^2)) - 0.234m^2] + F\frac{m^2+m_o^2}{m^2(1-m_o^2)} \quad (4)$$

In both formulas it may be seen that the first term depends on the material of the disk only and is not affected at all by the centrifugal force of the projecting masses. The second term is a function of the centrifugal force of the projecting masses only, and is independent of the mass of the disk. Separating these two terms in both formulas (3) and (4) gives the radial and tangential stresses for the punchings only, as follows:

$$\sigma_r' = T[0.408(1 + m_o^2 - m^2 - (m_o^2/m^2))] \quad (5)$$

$$\sigma_t' = T[0.408(1 + m_o^2 + (m_o^2/m^2)) - 0.234m^2] \quad (6)$$

For the coils only,

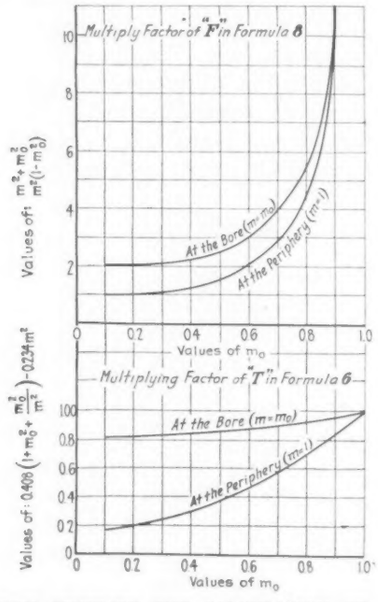
$$\sigma_r'' = F\,\frac{1 - (m_o^2/m^2)}{1 - m_o^2} \qquad (7)$$

$$\sigma_t'' = F\,\frac{m^2 + m_o^2}{m^2(1 - m_o^2)} \qquad (8)$$

Formulas 5, 6, 7 and 8 are perfectly general and apply both to the case of disks with a central hole and to the case of a solid disk (no hole at the center).

Stresses in Disk with a Central Hole

The tangential and the radial stresses at the bore and at the periphery are, in general, the most important to determine. By putting $m = m_o$ in the preceding formulas the stresses at the bore are obtained; by


Multiply Factor of "F" in Formula 6
Values of: $\frac{m^2+m_o^2}{m^2(1-m_o^2)}$
At the Bore ($m=m_o$)
At the Periphery ($m=1$)
Values of m_o
Multiplying Factor of "T" in Formula 6
Values of: $0.408\left(1+m_o^2+\frac{m_o^2}{m^2}\right)-0.234m^2$
At the Bore ($m=m_o$)
At the Periphery ($m=1$)
Values of m_o

CURVES WHICH SIMPLIFY THE CALCULATION OF TANGENTIAL STRESSES AT THE BORE AND PERIPHERY OF ROTOR PUNCHINGS WITH A CENTRAL HOLE

putting $m = 1$ those at the periphery are determined, giving:

$\sigma_r' = 0$ at the bore and at the periphery.

$\sigma_t' = T(0.816 + 0.174m_o^2) = (N/1000)^2\,(6.6R^2 + 1.4r^2)$ at the bore.

$\sigma_t' = T(0.174 + 0.816m_o^2) = (N/1000)^2\,(1.4R^2 + 6.6r^2)$ at the periphery.

$\sigma_r'' = 0$ at the bore.

$\sigma_r'' = F$ at the periphery.

$\sigma_t'' = F\,2/(1 - m_o^2)$ at the bore.

$\sigma_t'' = F(1 + m_o^2)/(1 - m_o^2)$ at the periphery.

Stresses in Solid Disk

In the case of a solid disk with no hole at the center $m_o = 0$. Stresses at the center are obtained by putting $m = m_o = 0$, and stresses at the periphery are obtained by putting $m = 1$, giving:

$\sigma_r' = \sigma_t' = 0.408T = (N/1000)^2 \times 3.3R^2$ at the center.

$\sigma_r' = 0$ at the periphery.

$\sigma_t' = 0.174T = (N/1000)^2 \times 1.4R^2$ at the periphery.

$\sigma_r'' = \sigma_t'' = F$ at the center and at the periphery.

In this way very simple formulas are given for both the tangential and the radial stress in thin disks at any point.

For the case of core punchings with a central hole all the elements are thus obtained which are needed for specifying what the difference in diameter between shaft, or spider, and punchings bore needs to be in order to make sure that when the machine is running at the highest speed for which it is designed the expansion of the bore is just equal to, or a little less than, the initial force-fit. This condition is obtained by having a force-fit at the bore equal to

$$(\sigma_t' + \sigma_t'')2r/E = 2\sigma_t r/E.$$

In *Engineering* for Aug. 3, 1917, the author gave some general formulas for σ_r and σ_t for disks of uniform thickness and for disks of hyperbolic profile, such as are used for turbine wheels, with a hole at the center.

MAKING THREE ESTIMATES IN VALUATION RATE CASES

Engineering Bases and Methods Used by Illinois Commission in Arriving at Value of Property for Rate-Making Purposes

Bert H. Peck, electrical engineer Illinois Public Utilities Commission, speaking before a joint meeting of the Western Society of Engineers and the Chicago Section of the American Institute of Electrical Engineers recently, outlined the Illinois commission methods of making three estimates on value of property in rate cases. These estimates are based on original cost, reproduction cost and normal reproduction cost. The commission worked out methods and developed plans of meeting each problem, and these were discussed by Mr. Peck.

In what the commission terms normal reproduction cost estimate it endeavors to eliminate those elements of equipment or cost appearing in the strictly reproduction estimate which may cause the latter to reflect results abnormally high or low. By abnormal equipment is meant such equipment as conditions indicate is unsuited for the requirements. By abnormal prices is meant those prices which, owing to abnormal market or purchasing conditions, do not truthfully reflect a reasonable result. In the preparation of normal reproduction estimates the commission is not governed by rigid adherence to the inventory, although departure into the realm of speculation is not intended.

It may appear, continued the speaker, that the preparation of three estimates would operate to further becloud issues which often are unnecessarily hazy. The time required is certainly greater than would be required for one estimate, but the situation as a whole may be clarified considerably.

If but one estimate was to be prepared, and that upon reproduction basis, a careful and painstaking engineer would wish as complete data as to conditions surrounding original installation as were available and would also wish to know original costs of equipment so far as obtainable. Thus, even though preparing a reproduction valuation, he would usually secure all data necessary for original and normal estimates. If all available information has been secured the compilation of data of this nature into estimate form is not so serious a task as might be anticipated. Preparation of three estimates enables the engineer to view his problem from as many angles and to present sound engineering opinions to the judicial authorities rather than engineering opinions tempered by opinions of economic justice.

Cyclic Fluctuations in Rate of Lamp Renewal

Investigations Indicate that It Is Not Justifiable to Judge Life Performance from Resultant Renewal Data Unless These Data Cover a Period of More than Ordinary Duration

BY M. D. COOPER
Engineering Department National Lamp Works

HERETOFORE it has not been generally recognized that in a lighting installation of incandescent lamps variations or fluctuations in the rate of renewals may be expected. It is, of course, natural to expect that when an entire new installation of lamps is put into service the rate of renewal for some time will be very low and that ultimately the rate of renewal will increase to the value determined by the average hours' use of the lamps and the average life of the lamps. The fluctuations in the rate of renewal which may be expected to happen in the interval between the initial low rate of renewal and the final expected rate are represented in this analysis for the first time, the writer believes. It is quite surprising to find that the rate of renewal does not rise steadily to its final value but goes through wide cyclic changes, rising on its first peak to a value 40 per cent above its final expectancy and not settling down to practically steady conformance with the expectancy until after the lapse of a period corresponding to the consumption of three or four lamps per socket.

The solid-line curve of Fig. 1 is a mortality or survivor curve which has been derived from careful tests on a large number of 60-watt tungsten lamps, and although it does not apply exactly to all sizes of lamps, it is typical of what may be expected from the sizes most frequently used. This curve is a graphical means of expressing the fact that not all of a lot of lamps whose life rating is, for instance, 1000 hours can be expected to live exactly 1000 hours and then fail. A very small proportion of any lot of lamps can be expected to fail within a short period after installation, although these are compensated for in the average life by those which live beyond their rated life. At first the rate of mortality is very low and steadily increases up to a time shortly subsequent to the average life of the entire lot of lamps. From this time on the rate of mortality continuously decreases until the entire lot of lamps has failed. The dotted-line curve of Fig. 1 shows the rate of failure corresponding to the solid-line mortality curve.

Analysis of Lamp Performance

To analyze what really happens, consider an entirely new installation of lamps and, for the time being, assume that the average hours' use per day for all lamps is the same. After dividing the life of the lamps up into a number of small periods, it is possible to determine from the mortality curve the number of renewals of the original lamps of the installation which will have to be made in each respective period. It is then possible to distribute these renewals among future periods in accordance with the mortality curve and, by continuing the process, to ascertain the total number of renewals which can be anticipated in each respective period in the future. Until the original lamps are well along toward the end of their life, there will not be very many renewal lamps in the installation, and since the renewal lamps can be expected to survive the original lamps, the curve of the total rate of renewal (Fig. 2) will have a shape more or less closely approximating the shape of the rate of failure curve (Fig. 1) for some time after the installation is put into service. It may be noted that there is a peak of 40 per cent above normal in the total renewal curve at approximately 1300 hours, corresponding roughly to the first peak in the rate of failure curve (Fig. 1). Corresponding to the subsequent decline in the dotted line of Fig. 1, the total renewal curve shows a decided slump from the first peak.

The injection of new lamps into the installation at the high rate corresponding to the first peak will naturally bring about an abnormal rate of renewal at a time about one lamp life later. Owing to the distributing effect of deviation of individual lamp lives from the average, the second peak will not be so pronounced as the first. Likewise subsequent peaks will be still less prominent. As time progresses the oscillations of the rate of renewal above and below the normal value become less and less. Finally after 4000 or 5000 burning hours they become practically negligible.

In the preceding discussion it was assumed that the installation of lamps adheres to the mortality curve derived from test as shown in Fig. 1, or, in other words, that all of the lamps in the installation receive the same amount of burning per day. The effect of deviation from average in the burning hours of different lamps or of different parts of the installation is to straighten the resultant effective mortality curve. A mortality curve like the straight line of Fig. 3 is doubtless somewhat beyond the ultimate limit of the straightening effect of diversity in daily hours' use. For such a straight line mortality curve the rate of renewal will show cyclic variations as illustrated by Fig. 4. This curve differs from that of Fig. 2 in a number of details, although the same general characteristics are evident.

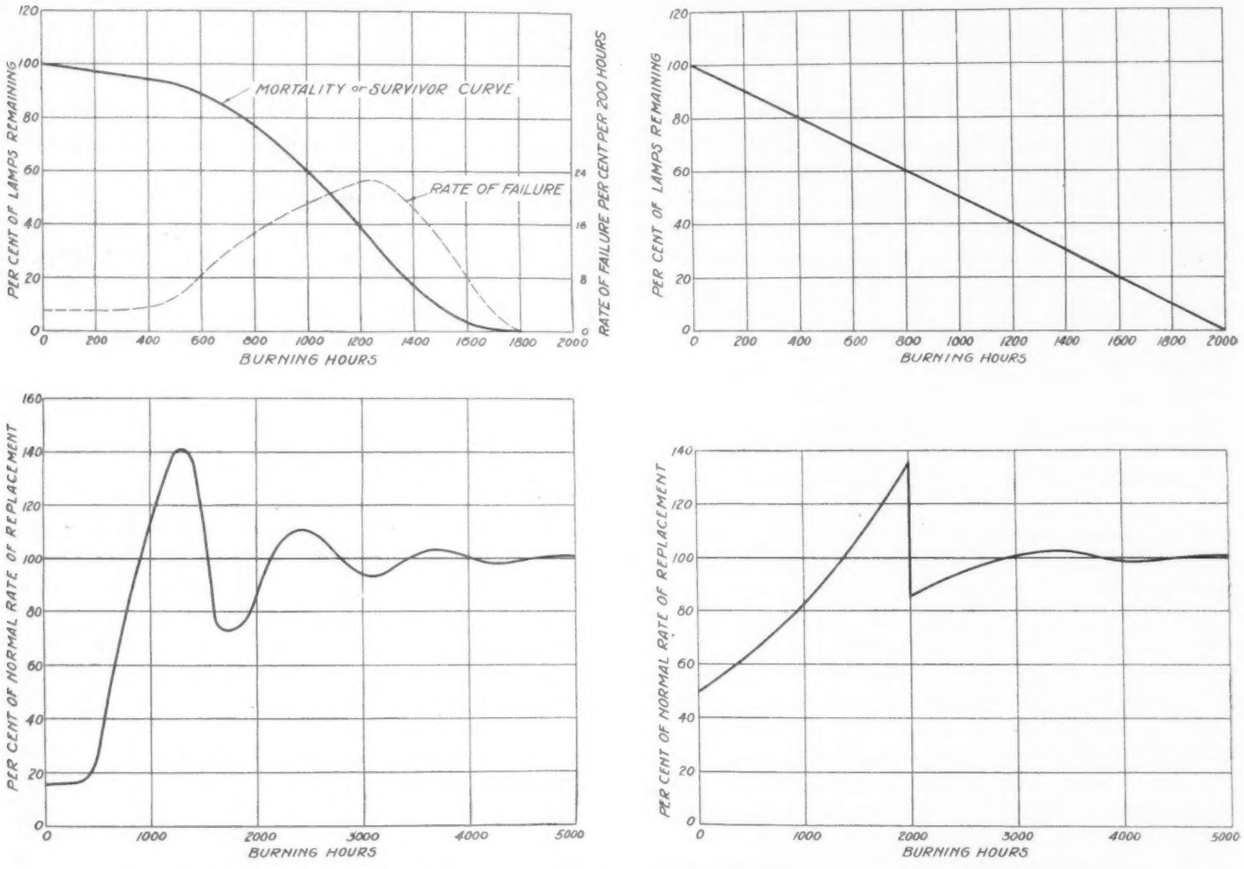
As an illustration of the smoothing-out effect on the mortality curve of diversity in hours' use of the lamps, a mortality curve is derived for the following distribution of lamps with respect to hours' use:

No. Lamps	Hours Per Day	No. Lamps	Hours Per Day
10	24	100	8
20	18	200	6
50	12	500	4
70	10	50	2
Total	1,000	Average	6

A comparison of the standard mortality curve and the mortality curve which obtains in this assumed installation is shown in Fig. 5. This mortality curve lies about halfway between the standard curve and the straight line of Fig. 3. The most significant difference is the attenuation of the lower end of the curve. This

attenuation would have the effect of rounding off the first sharp peak and trough of Fig. 4 and making the curve of total rate of renewal more nearly the same in shape as Fig. 2.

these cyclic fluctuations may not be entirely eliminated until after a time corresponding to the life of four or five lamps. Any disturbance of steady conditions, or any change which would result in a large part of an


PER CENT OF LAMPS REMAINING
MORTALITY or SURVIVOR CURVE
RATE OF FAILURE
RATE OF FAILURE PER CENT PER 200 HOURS
BURNING HOURS
PER CENT OF NORMAL RATE OF REPLACEMENT
BURNING HOURS

FIGS. 1 TO 4—MORTALITY AND SURVIVOR CURVES, AND CYCLIC VARIATIONS IN LAMP RENEWALS (SEE TEXT)

In deriving Fig. 2 uniform daily hours' use of the lamps is assumed, and Fig. 4 goes beyond the limit of possible effect of diversity in hours' use; therefore a similar curve for any actual installation must lie somewhere between these two curves (Figs. 2 and 4). The two resultant curves of total rate of renewal show slight quantitative differences, although the qualitative

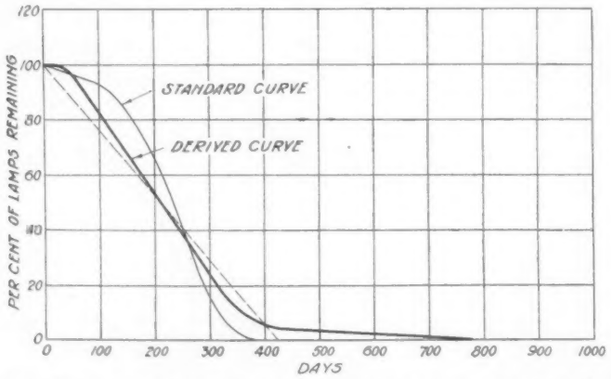


FIG. 5—COMPARISON OF STANDARD MORTALITY CURVE WITH THAT OBTAINED IN ONE PARTICULAR INSTANCE (SEE TEXT)

conclusions from both are about the same, namely, that under perfectly normal conditions the rate of renewal in a new installation of incandescent lamps may be expected to undergo severe cyclic fluctuations and that installation being renewed at one time, could be expected to bring about similar results, although of course in less degree.

If this discussion be extended to cover the possible effect of seasonal variations in the hours' use per day of a lighting installation, it may be seen that there is a possibility for even greater fluctuations in the total rate of renewal per month. As representative of average variations in hours' use per day of lighting installations, the following data from one of the largest central stations in this country are presented, showing the distribution of its annual lighting kilowatt-hour sales among the various months of the year:

Month	Per Cent of Year	Per Cent of Average Month	Month	Per Cent of Year	Per Cent of Average Month
January	10.9	131	July	6.4	77
February	9.3	112	August	6.4	77
March	8.6	103	September ...	7.4	89
April	7.8	93	October	8.4	101
May	7.1	85	November ...	9.7	116
June	6.8	82	December ...	11.2	134

Even in the average for a great variety of lighting installations, the seasonal variation in the hours' use per day amounts to nearly as much as two to one, and in individual cases this variation from winter to summer use may be even more than two to one.

Applying the foregoing data on seasonal variation of hours' use per day, it can be seen that if the peak of the

rate of renewal curve as shown in Fig. 2 occurs in the winter and the succeeding trough of the curve occurs in the summer, the possible fluctuations in the monthly rate of renewal will run from 190 per cent to 55 per cent instead of from 140 per cent to 70 per cent as shown by the curve. Conversely, if the first peak should occur in summer and the succeeding trough in winter, the peak might be reduced to about 110 per cent of normal and the trough increased to 95 per cent of normal, thus very nearly eliminating the fluctuations of the first cycle.

The phenomena which have been discussed may offer a logical explanation of fluctuations in the rate of renewal of incandescent lamps which heretofore have been the cause of unfavorable speculation regarding the uniformity of the lamps. A manifest conclusion from the discussion is that it is not justifiable to judge the life performance of an installation of incandescent lamps from the resultant renewal data unless the renewal data cover a period of time sufficient for the averaging out of fluctuations in the rate of renewal caused by simultaneous replacement of all or a considerable proportion of the lamps in the installation.

ELECTRICAL PREPARATION FOR ORDNANCE BASE IN FRANCE

Importance of Electrical Equipment and Engineers in Preparations that Government Is Making for Our Army in France

Some idea of the extent to which electrical equipment and men qualified for electrical work are being required for the army may be obtained from recent advice regarding the American ordnance base depot now being built in France. This depot, which will be used for the repair and salvage of ordnance material, including cannon, guns, pistols, gun carriages, trucks, leather equipment, etc., will have over 2,500,000 sq. ft. (230,000 sq. m.) of floor space, will engage several thousand employees and require about 8000 kw. in electrical apparatus, principally motors and incandescent lamps, although electric furnaces will also be used in the shrinkage pits.

Energy will be received temporarily from some reliable electric system or systems in France, continuity of service being assured by the utilization of water power and by priority rights on fuel required for generating purposes. A power plant may also be built at the base depot to serve as a reserve. Gasoline and fuel oil are being considered for producing the motive power.

Although the electric service available is 50-cycle, three-phase, standard 60-cycle motors are being used and operated at the slightly lower rating resulting from the lower frequency. Except for large machines like boring lathes and grinders all of the machines are group-driven by alternating-current motors. The boring lathes are individually driven by direct-current motors. In the gun shop alone there are a large number of boring lathes measuring 30 in. to 48 in. (76.2 cm. to 121.9 cm.) in swing and 30 ft. to 60 ft. (9.1 m. to 18.3 m.) in bed length. The individual motors in many cases are mounted on concrete blocks beside the machines. Owing to the weight of most of the ordnance material handled, cranes will be used extensively.

In preparing for this depot the Ordnance Department had to determine where power was available in France and in what quantities. Considerable information on this subject was obtained from the report by C. O. Mailloux on water-power development in France, while more detailed information was secured through investigating engineers in France. Practically all machine tools, motors and control apparatus were secured from this country through manufacturers who were able to turn out large quantities in a short period. In several cases equipment destined for other places was commandeered by the government for this depot.

Preparation for this depot as well as the present construction work are being carried out under the supervision of Major General William Crozier and Lieutenant Colonel D. M. King.

Electrical manufacturers who are in a position to supply government orders promptly and who desire to know the ordnance department's needs can address Colonel King, 613 G Street, N. W., Washington, D. C.

This department also requires the service of draftsmen, electrical engineers, electricians, dynamo tenders, both stationary and locomotive engineers and firemen, boiler inspectors, autogenous welders, etc. Pay ranges from $30 to $61.20 per month, depending upon demonstrated ability and place of service. Enlistment is for duration of the war only. In addition to the regular pay, free quarters, rations, clothing, bedding, medical and dental attention are provided by the government. Application blanks can be secured at the nearest recruiting office or by writing to the War Department, Office of the Chief of Ordnance, Enlisted Personnel Division, Washington, D. C. Applicants must be between thirty-one and forty years, citizens or declarants; must be able to speak, read and write the English language and should have no absolute dependents.

High-Speed Slip Rings

In order to meet the requirements for slip rings for high-speed dynamo-electric machinery as regards safety in service, it has been ordinary practice to employ material of very high tensile strength, permitting a sufficiently great safety factor. Materials possessing these qualities, however, have the characteristic of being of relatively poor conductivity, resulting in high ohmic losses, especially in case of machinery for large current strength as employed in electrochemical work. Also by reason of electrolytic phenomena troubles are liable to occur; for instance, copper will be carried off from the negative copper brushes and deposited upon the surface of a slip ring, this deposited copper on account of its unsuited structure resulting in a heavy sparking.

PINS USED TO HOLD RINGS IN PLACE

In consequence of this fact W. Gscheidlen of Berlin, in patent No. 1,243,286, suggests obviating the difficulties mentioned by employing as material for slip rings a metal strip, ribbon or band which is wound on edge to form a cylindrical spiral with firmly adjacent turns. A slip ring of this type of construction has a considerably higher tensile strength in peripheral direction than can be obtained in case the ring is made from cast or pressed material.

STANDARDIZATION OF LIGHTING CAN EXPEDITE SHIPBUILDING

Study of the Lighting of Vessels Where Construction Has Not Progressed to Point at Which Permanent Equipment Can Be Used

BY WILLIAM G. HEXAMER
Electrical Engineer Chester Shipbuilding Company

AS EVERY effort in this country must be bent toward expediting the building of ships, standardization of equipment should be seriously considered as one means to that end. Great opportunities are offered along this line in the standardization of the electrical equipment for the temporary lighting of vessels under construction, particularly where the same or similar types of ships are being built. This work may be divided into three subdivisions:

1. The permanent wiring on the permanent ways, which can be so constructed as to cover almost any electrical demand.

2. The lighting of vessels which have not as yet reached the stage of construction where a regular standardized temporary system can be installed.

3. The regular temporary wiring system, which must be so constructed that it can be repeatedly used from one vessel to another without much more than minor changes.

Considering these subjects consecutively, permanent ways can be wired from a three-wire 110-220 volt system. At the Chester (Pa.) Shipbuilding Company's plant it has been found advisable to run three No. 2 mains from a junction box at the head of the ways through 1¼-in. (3.16-cm.) conduit to a point where the water line makes it impracticable to continue. This covers practically two-thirds of the ways. At 20-ft. (6-m.) intervals in this line are installed YX condulets each containing a three to two-wire double-branch cutout fitted for 30-amp. plug fuses. Two No. 8 wires feed a Q. H. A. condulet on each side of the ways through ¾-in. (1.86-cm.) conduit.

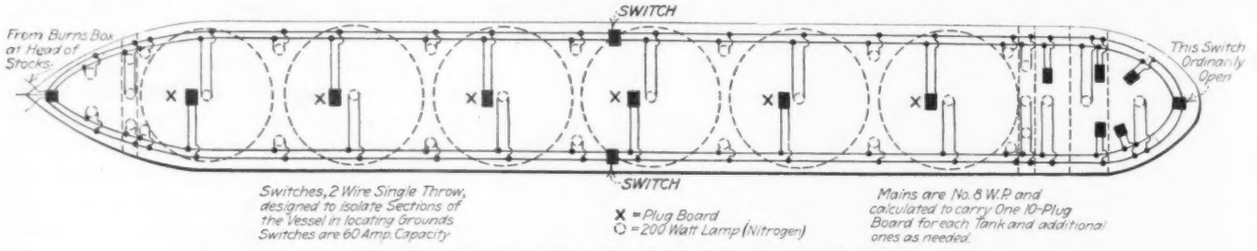
In conjunction with this system there is also installed at the head of the permanent stocks a Burns watertight box containing a three-wire single-throw 100-amp. knife switch. The box is mounted at the approximate height of the new vessel's forecastle and is intended for temporary wiring when the vessel has reached that stage of construction, making its own temporary system necessary. The permanent ways in this installation are approximately 430 ft. (170 m.) long.

Lighting of the hull while it is in the first stage of construction is of minor consideration, as there is usually plenty of daylight before the decking is placed. However, as double bottoms and various tanks reach completion temporary lighting by means of portable lamps is necessary. At this point of construction a specially designed plug board, with provision for ten outlets, is placed at the point of greatest demand in the Chester (Pa.) Shipbuilding Company's plant. The plug board is as nearly foolproof as one can be made, and is fed from a Q. H. A. receptacle by means of an R. Q. plug and the necessary length of two-wire deck cable. These boards are kept in stock, made up, and are a part of the standardized electrical equipment of the yard.

Portable taps made in 50-ft. (15-m.) lengths and equipped with specially designed plugs of very rugged construction are taken from the plug boards previously mentioned. The plugs are designed to be tapped into one of the outlets of the plug board. One end of the "portable" is attached to a weatherproof receptacle equipped with a 60-watt lamp and a locking guard. Carbon lamps are preferable for portable work as their filaments are more rugged, and, in the writer's opinion, riveters are not the gentlest of workmen.

As the writer's experience has been mostly with vessels containing six cylindrical tanks, the lighting of such vessels from the time that the decking is placed until the permanent electrical equipment is in service will be discussed. In the writer's estimation a tank vessel is one of the worst types to light in a proper way temporarily. After considerable experimenting a solution to the problems presented was reached. Upon the deck of the vessel—or, rather, at the edge of the main trunk deck—a set of No. 8 weatherproof mains is installed. The mains are mounted upon heavy porcelain knobs previously attached to a block about 2½ in. by 8 in. by 6 in. (6.35 cm. by 20.32 cm. by 15.25 cm.) and fastened to the edge of the trunk deck by means of a universal girder clamp. The blocks are made in large numbers and are kept in stock as part of the standard temporary equipment.

The mains are stretched on each side of the vessel and are fed from the permanent outlet previously described and installed at the head of the ways. This circuit is then again subdivided into four sections by means of 60-amp. single-throw knife switches. The sections are ordinarily connected but may be isolated to facilitate the finding of grounds. Ordinarily the switch at the stern is, of course, kept open, but it can be closed in case either side of the three-wire system is blown out, thus keeping the loop complete until re-


SWITCH
From Burns Box at Head of Stocks
This Switch Ordinarily Open
SWITCH
Switches, 2 Wire Single Throw, designed to isolate Sections of the Vessel in locating Grounds. Switches are 60 Amp. Capacity
X = Plug Board
O = 200 Watt Lamp (Nitrogen)
Mains are No. 8 W.P. and calculated to carry One 10-Plug Board for each Tank and additional ones as needed.

LIGHTING CIRCUITS ADVISABLE DURING SHIP CONSTRUCTION

pairs can be made. While the switches previously mentioned are part of the standard temporary equipment, they are mounted in strongly made wooden boxes of weatherproof construction. The ordinary slate base switch is used with standard cartridge fuses.

From the mains the taps are taken for the plug boards and for a standardized temporary lighting unit, consisting of an X-5423 Benjamin shade, the usual suspension loop, a No. 1388 guard and a 200-watt nitrogen

lamp. This unit is also used in the tank vessels. One unit is placed at the top of each cylindrical tank, one in each wing tank, three in the engine room, three in the fuel tanks and five in the forecastle, making thirty units in all. The units are so arranged electrically that the circuit is as nearly balanced as possible. These units are only for general illumination.

For close work the "portables" previously described are relied upon, one plug board being installed in each tank, and as the work progresses in the other portions of the vessel. As the plug boards have provisions for ten outlets and the standard "portable" has a length of 50 ft. (15 m.), quite a working radius is obtained. The plug boards before mentioned are built in the yard and are each equipped with 20-amp. link fuses protected by an iron plate.

In freight vessels the problem is very much simplified as the hull is not subdivided as much as in tankers. While the standardized mains are used the general arrangement is much simpler, a single set of heavy mains installed down the center of the main deck being sufficient. Since fewer lighting units are used only half as many plug boards are required. To locate grounds it is, however, advisable to subdivide the mains as in the tankers and use ground detectors. The mains are of ample size for electrical drilling and reaming.

Credit and Collection Prospects for 1918

Strict Adherence to Terms, Better Credit Analysis and Demands on Customers for the Employment of Better Business Methods Are Certain to Be of Greater Importance than Ever

BY M. A. CURRAN

General Credit Manager Western Electric Company

THE prospects of credits and collections in the electrical industry for 1918 must, it seems to the writer, be judged, first, from these prospects for the country's business at large and, second, from the position the electrical industry will occupy as an essential to the war. The country's business at large has been going through a period of readjustment since our participation in the war became assured, but rather slowly until the last few months, when it became more marked. It is likely that it will be much more rapid from now on and continue so until financially and industrially the nation is on a war basis.

The most apparent phase of this readjustment has been the change in the financial situation. From an easy banking condition and a fair investment market we find that the pendulum has swung backward swiftly though smoothly. The banks are ably taking on a heavier daily load, and the investment market is narrowing. The Federal Reserve banks, by exercising their rediscounting and note-issuing functions, are relieving the strain, but the investment market—and by this is not meant the speculator but the distributer of the country's new capital—does not show prospects of early improvement.

The war has the first call on raw products, labor, machinery, power, transportation, communication, etc., of the country. Our financial resources must necessarily go as far and as long as these.

Broadly speaking, as far as the electrical industry is mustered into the ranks just so far will it be assured of production, sales and finances, and as far as it sells to those similarly mustered will its credits and collections be good. This must not be interpreted as meaning that only those directly producing the sinews of war will enjoy good business conditions. We have learned that modern war requires a complex economic underpinning; hence many and various lines of business will share these good conditions. The credit manager's ability to distinguish the relative position of such concerns will be just as important a part of his credit analysis as his appraisal of assets and liabilities.

Government bonds and taxes will withdraw funds from usual channels and disburse them into unusual ones. True, very little of these billions will leave this country, so at first glance it might seem that there will be just as much money as usual and that therefore business should be as usual. However, war is a waster, not a producer, of wealth, and geography does not mark the economic boundaries of different lines of business.

The government now has under consideration the formation of a committee to cope with the disbursement of capital for necessary financing similar to the one established in England for the same purpose. Such action, it appears, will probably take place, and from this we may expect relief to some extent for the public utility confronted with a narrowing margin of net and the necessity of funding or renewing maturing stocks and bonds, as well as extensions not paid for, or those which are necessary or to which they are irretrievably committed.

The government, through its Federal Reserve banks, principally by issuing Federal Reserve currency against rediscounted paper, of which an important element will be trade acceptances, will largely meet the credit and currency requirements for the distribution of commodities in process toward consumption.

The government by various means will stabilize conditions considerably, and generally promote as active a business situation as possible; but it must be remembered that there is a point beyond which it is economically impossible for any government to become effective. For instance, consider the war savings stamps. It is aimed to raise two billion dollars on these, and practically all of it will come out of the wage earners' small change, which has heretofore been spent in retail establishments catering to him. This expenditure the average American wage earner will reduce largely, and the writer can think of no way in which the government can help these retailers.

Analyses of failure show that overbuying, underfinancing, improper or no accounting, excessive overhead, slow turnovers and unwise credits constitute the bulk of the causes. Business, largely because of unintelligent competition, has tolerated or fostered their

growth—whether knowingly or otherwise does not matter in present circumstances. Each business will have to prove its case, and internal efficiency will be its principal evidence at the bar of economics. We will all have to do, not a little more, but a whole lot better than ever before, and that idea must be sold throughout the trade. There never was a better time for the constructive credit manager to drive home to his customers the importance of intelligent accounting, buying and merchandising, reduced overhead and faster turnovers.

There never was a better time for absolute frankness between debtor and creditor. Many customers are reluctant to give adequate details of their business affairs, and credit managers have passed their orders on more or less sketchy deductions. Customers have likewise been indulged in terms, in many cases the necessity lying not in the nature of the business itself but in the faulty administration of the man. The principal premise for credit in many cases has been the so-called moral quality of the risk—the disposition toward fair and honest dealing. This quality is still highly valuable, but it will need support, that of the ability as well as the will to meet the obligation.

During the business boom of the last few years credit surveillance relaxed, and credit, always cheap in this country, became cheaper still. True, bills were paid, but then it was comparatively easy to pay them. Credit, in sympathy with economic conditions, is going up in price, and that price, I believe, must be as much ability backed by performance as quick assets over liabilities. There will be no room in the era ahead of us for catch-as-catch-can credits.

We, the creditor, the debtor, the business man, without distinction as to character or size of business, have all the common will to win this war and do not hesitate to enlist our efforts and wealth willingly, because we recognize the necessity of concerted action. That's our understanding of patriotism. Sound business is always good citizenship in times of peace as well as war, but it has not been widely enough so recognized. It now becomes a necessity, and therein lies our opportunity for patriotic service, and there should be the same feeling of common cause. It is not emotional patriotism we need now, it is the stern, solid, thinking kind that fully comprehends the task and has the will and the strength to do.

Deeper Credit Analysis Necessary

The customer who pleads some general business condition as the cause of non-payment of his bills is well known. Credit men may have analyzed a few such cases and found that this condition touched the customers' affairs only remotely, if at all, and even then the difficulty could generally have been overcome if they had not been brought up in the habit of following the line of least resistance with creditors. The trouble has been that these excuses have not been tested often enough. It is likely that the industry will be confronted with many such customers as business adjustment goes on, and while there will still be liberal consideration, the debtor must prove his case. The former habit of holding a brief for him will be out of date.

Financial statements should be more freely given and taken. Their analysis should extend much further than a mere reduction of net worth or quick assets versus quick liabilities. The character of the business, the ability of the management, are going to be larger factors than formerly in determining the duration of that net worth and how long the assets will remain quick. What the business has done in past years is not going to be a safe guide to what it will do. The writer believes that, where the ability of the management has been evidenced in the past, that ability will carry the business further during these times than net worth alone. Due consideration should likewise be given to withdrawals for dividends or profits to proprietors, likewise to recent plant extensions which may become useless and unsalable or non-convertible.

Another question which credit men will have to consider will be the financing of the excess profits tax. This will be more difficult for those businesses which have made good earnings but are confronted with unfavorable conditions because of the nature of the business. There are many other questions which will arise as each case presents itself, and the writer would recommend that an answer to each be written by the credit manager on each statement for his own information. Every one has had accounts disastrous for himself as well as the debtor where a knowledge of the situation and its frank discussion would have saved a good business and a good customer. Now more than ever is the time for such knowledge and discussion.

Terms Must Be Strict on F. O. B. Shipping Point

Government control of supplies will likely result in a generally smaller merchandise investment actually on hand, but delays in transportation will correspondingly increase the merchandise book account, as they will also increase the creditors' receivables. This latter will naturally result in an increased line of credit to each account as the merchandise will be longer in transportation between date of billing and due date of bill. Strict adherence to terms of payment by the debtor on goods sold F. O. B. shipping point will be the creditor's only relief from carrying all the contingencies of the transportation situation.

Recently some businesses, principally retailers in other lines than electrical, have advertised that they would take Liberty bonds in settlement of sales. We all recognize the economic importance of these bonds being held as widely as possible. Aside from this consideration, it is not ethical, in view of the high purpose of these bonds, to reduce them to the medium of barter, common currency. If a customer must or will give up these bonds, they should be sold through the regular channels. Using these bonds in this way is worthy only in so far as paying one's bills is worthy and not otherwise possible.

Every one is full of American confidence. Some do not call it by as nice a name; but, call it boastfulness, cocksureness, headlong optimism, egotism or what, history shows that dividends have been regularly paid on American characteristics. Recent world developments indicate that civilization is in the melting pot, and from it may be expected political, social and economic changes for which history furnishes no precedent. There is one principle that can be relied upon. Business has been and always will be. What it will be rests upon our present stewardship, not only individually but collectively. We are all partners in a grand adventure, and only those who can hold up their end will remain in the firm.

STATION & OPERATING PRACTICE

A Department Devoted to Problems of Installation, Operation and Maintenance of Equipment for Economical Generation and Distribution of Electrical Energy

GETTING GOOD SAMPLES OF BOILER-FEED WATER

Instructions to Be Followed to Insure that the Water Received by the Laboratory Is a True Specimen

BY T. W. REYNOLDS

The following are instructions used by an Eastern company for taking and forwarding samples of boiler-feed water to the laboratory:

Before the bottle has left the laboratory it has been washed so that it needs only to be rinsed with the water which is to be sampled. Upon receipt of the bottle, remove it from the box, detach the tag and rinse the bottle thoroughly with the water which is to be sampled.

The sample should be collected in the bottle if possible, not in some other vessel and then transferred to the bottle. If drawn from a tap allow the water to run for a time before filling the bottle. If taken from a body of water immerse the bottle if possible below the surface and allow to fill for rinsing, and then fill again for sample. The water should be taken from that part of the body of water which most nearly represents the water in use or to be used. This may be at an intake pipe or in a stream from a part far enough from the bank to avoid water comparatively stagnant. Do not allow the water actually coming into the bottle to touch the hands. Fill the bottle to within 3 in. (7.6 cm.) of the top; twist the stopper securely into the bottle, and having attached an envelope with the necessary data, replace the bottle in its case and forward by express.

Most laboratories have a standard blank form calling for certain information, and this should be carefully prepared and filled out.

MILL PRODUCTION INCREASED BY REPLACING STEAM ENGINE

The Constant Even Speed Obtained from a Two-Speed Motor Has Resulted in a Noticeable Increase in Production of a Steel Mill

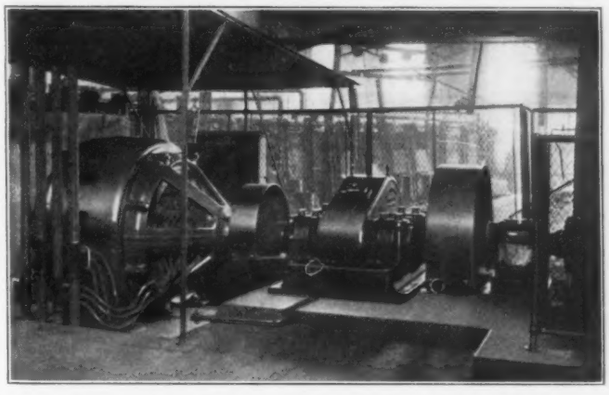
An example of the successful replacement of a steam engine by an electric motor is furnished by the installation in the plant of the Cleveland Hardware Company, Cleveland, Ohio, where drop forgings for automobiles and similar classes of service are manufactured.

For a period of thirty-five years the company had been operating a 9-in. (22.8-cm.) Merchant rolling mill belted to a steam engine which by this time had outlived its usefulness, and it was necessary to install a new drive, as breakdowns were becoming frequent. After a careful investigation into the best-type driving unit the unanimous decision was that an electric motor was the only logical solution of the problem. Absence of any trouble since the installation and an economy of operation better than was anticipated have resulted.

The motor is placed close to and connected by gears to the rolls, and this with the transformers and control constitutes all the apparatus necessary. Energy is obtained from the Cleveland Illuminating Company at 11,000 volts and is stepped down to 2200 volts.

The motor is of the wound-rotor type with a rating of 450 hp. at 900 r.p.m. and 360 hp. at 720 r.p.m. These synchronous speeds are obtained through a double winding designed to give the motor either eight or ten poles, according to the speed desired. The synchronous speeds of the motor are reduced to speeds of the mill shaft of 240 and 192 r.p.m. respectively by means of a herringbone-type gear drive which operates in oil in a completely inclosed case.

The motor shaft is connected to the pinion by means of a Nuttall spring-type flexible coupling especially designed for steel-mill service. A similar coupling connects the gear to a 10-ton open-hearth steel flywheel 12 ft. (3.7 m.) in diameter, which is mounted on two extra heavy pillow blocks, the other end being connected to the rolling mill. The wheel is made in one piece with rectangular arms.



TWO-SPEED WOUND-ROTOR MOTOR DRIVING STEEL-MILL ROLLS

The control of the equipment is handled by a two-panel black enameled switchboard mounted on angle-iron framework. The switches for changing the windings on the motor from eight to ten poles are oil-immersed, one in the primary and one in the secondary circuit. Proper markings are placed thereon so that the mill operator can easily manipulate them. The primary breakers are mechanically interlocked in such a way that only one can be closed at a time.

In case it is necessary to stop the mill quickly, as in an emergency, the running breaker is tripped, which causes all the secondary breakers to open. The operator then closes the reverse breaker, thus quickly bringing the motor to rest.

An idea of the work being done by the mill may be gained from the following figures: In an average eight-hour shift the average tonnage of 5/8-in. (1.6-cm.) rounds from 4-in. by 4-in. (10.2-cm. by 10.2-cm.) billets, 90 lb. to 100 lb. (40.8 kg. to 44.9 kg.) weight, 25 per cent carbon, is 35 tons; 7/8-in. (2.2-cm.) squares, 45 tons; 1 3/4-in. by 1/4-in. (4.4-cm. by 6-mm.) flats, 40 tons; 100 lb. to 135 lb. (44.9 kg. to 61.2 kg.), 5-in. by 5/16-in. (10.2-cm. by 8-mm.) flats, 35 tons; 2-in. by 3-in. (5.1-

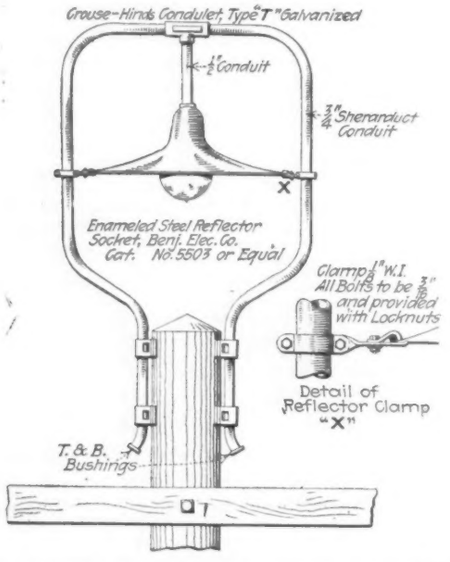
cm. by 7.6-cm), 40 lb. (18.1 kg.) weight, 15 per cent carbon, ¾-in. by ⅛-in. (1.9-cm. by 3-mm.) flats, 15 tons; 50 lb. (22.7 kg.) weight, ¾-in. by 3/16-in. (1.9-cm. by 5-mm.) flats, 20 tons; 40 lb. (18.1 kg.) weight, ⅜-in. (9.5-mm.) rounds, 20 tons; 55 lb. (24.9 kg.) weight, ½-in. by 5/16-in. (12.7-mm. by 8-mm.) ovals, 30 tons.

UTILIZING EXISTING POLES FOR YARD-LIGHTING FIXTURES

Details of Economical Method for Constructing Fixtures for Use in Outside Yard or for Street-Lighting Work

Existing poles supporting wires for various purposes may be in locations advantageous for yard lighting or at least near enough to warrant their use for temporary lighting. In addition, there are cases where economy dictates the use of this method for street lighting. Furthermore, in running a new line it is often possible and practicable, having in mind such use, to locate the poles without an appreciable amount of extra wiring becoming necessary.

Referring to the accompanying drawing, two ¾-in. (1.9-cm.) conduits are bent as shown and secured by clamps to the pole top. The necessary material for this work is four 2-in. by ½-in. (5.08-cm. by 1.27-cm.) iron straps bent to the circumference of the pole and four 2-in. by 3/16-in. (5.08-cm. by 4.8-cm.) iron straps bent around the conduit and fastened by ½-in. (1.27-cm.) lag screws to the pole. The conduit ends begin with T. & B. bushings and are connected about the center of the pole by means of a galvanized T-conduit from which a ½-in. (1.27-cm.) conduit is extended to the reflector. The latter is of steel and supported on two sides by ⅛-in. (3.2-mm.) iron straps bent around the ¾-in.


Crouse-Hinds Condulet, Type "T" Galvanized
½" Conduit
¾" Sheraduct Conduit
Enameled Steel Reflector Socket, Benj. Elec. Co. Cat. No. 5503 or Equal
Clamp ⅛" W.I. All Bolts to be ¾" and provided with Locknuts
Detail of Reflector Clamp "X"
T. & B. Bushings

METHOD OF USING LAMP-CIRCUIT CONDUIT TO SUPPORT LAMP AND REFLECTOR

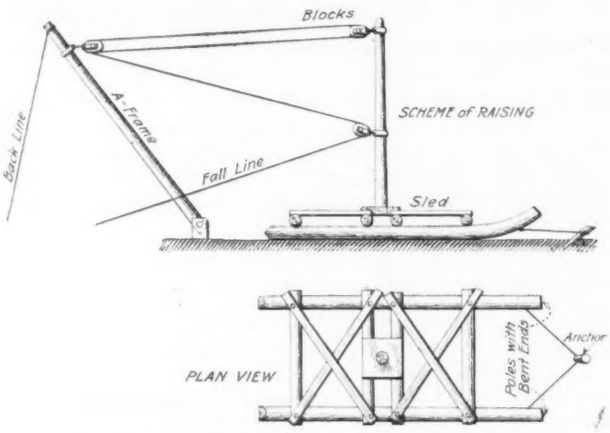
(1.19-cm.) conduit uprights and bolted with 3/16-in. (0.48-mm.) bolts and lock-nuts.

The fixture should, of course, be made thoroughly weatherproof by the application of two coats of paint. There is no economy whatever in the paint-saving methods sometimes employed.

INEXPENSIVE GIN SLED USED FOR WINTER WORK

Wooden Poles and Broken Pieces of Poles May Be Utilized to Make an Outfit Designed for Raising A-Frame Towers

The accompanying illustration shows how a gin sled was made by the Iowa Railway & Light Company of Cedar Rapids, Iowa, for raising A-frame towers on a cross-country transmission line. Wooden poles that had



GIN SLED MADE OF OLD POLES WITH BENT ENDS

been broken and old poles that had ceased to be useful except as firewood or "deadmen" were used. This sled was made instead of a wagon because it was cheaper and could be made to stay on the ground better under a heavy pull on uneven ground. It was dragged on the snow or wet earth from pole to pole by a single team of horses. The team was also used on the fall line. When fences were encountered they were cut down to allow the sled to pass.

The runners of the sled were made from poles which had crooked ends to get the desirable "turned-up" characteristics of properly fashioned sled runners. Most of the joints in the sled were made with bolts which were salvaged when the sled was abandoned.

PREVENTING EXPLOSIONS IN BOILER FURNACES

Necessity of Special Consideration When Using Low-Grade Fuel—Apparent Causes and Methods of Prevention

BY GILBERT RUTHERFORD

Probably every one who has operated boilers has at some time encountered the furnace explosion that blows fire doors open and singes the fireman's hair with the hot flame or blows coal particles into his face or eyes. The incident is not uncommon and, although potentially a dangerous occurrence, fortunately in most cases causes only temporary disability. The use of so-called low-grade fuels at this time of coal scarcity and high prices for marketable coal tends to increase the seriousness of furnace explosions. A brief discussion of their cause and prevention, based on the writer's experience, may therefore be of value.

Furnace explosions happen either when the furnace door is opened or when it is closed. The reason for the

explosion is the same in both cases, but the manner in which the explosion is brought about is different in the two cases.

Consider an instance where a furnace is incased in a setting that is new and airtight so that air infiltration is eliminated by plastering up cracks and crevices, etc. No air enters above the fuel bed, and the furnace chamber is filled with combustible gases. The fire doors are closed and the furnace is operating, and at fairly low rate of combustion, which means comparatively high draft for a thick fuel bed. The fireman now opens the fire door to throw on some more coal or to look at the fire or rake it over. There being a difference of pressure between the inside and the outside of the furnace chamber, such that the air rushes from the outside to the inside, the air from the boiler room is caused to rush in immediately and mix with the combustible gases above the fire. Combustion occurs instantly and with such rapidity that it has an explosive effect, blowing out the gas and coal into the face of the fireman. The simplest remedy is to maintain balanced pressures, or nearly so, between the inside and outside of the furnace chamber.

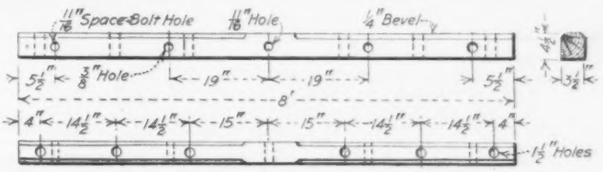
Another common cause of explosion is in cases where the furnace doors are closed after being opened. Suppose a fireman throws a shovelful of slack coal—for example, anthracite dust—upon the fire. To prevent cooling the fires he opens the door wide, throws in the coal as quickly as possible and shuts the door again immediately. While the fire door is open the furnace settings fill with air, partially at least. The slack coal thrown on the fire spreads over the fuel bed and combustible gases are distilled. The gases rising from the fire may contain as much as 30 per cent of combustible. This mixes with the air entrained in the setting, the mixture becomes ignited, a small explosion occurs, and the firedoor of the furnace is blown open with considerable force as a consequence.

DRILL ALL CROSS-ARMS TO TAKE SPACE BOLTS

Found More Economical Inasmuch as Large Percentage of Arms Used in City Construction Are Involved in Double-Arm Pairs

In ordinary city construction most companies employ double arms at railroad and street railroad crossings, at corner poles or curves and at points where one or more wires dead-end. One company made a check of the number of double arms used in city construction, and it was surprising to find that in a typical commercial and industrial district 64.5 per cent of the arms in place were involved in double-arm pairs. In a typical residence district the percentage was somewhat less, being 58 per cent. This large number is, of course, due primarily to the number of lines dead-ended at double-pole corners.

It was decided at once that all cross-arms should be drilled for double arming or space bolts in the process of manufacture. The drilling of an 11/16-in. (1.7-cm.) hole in the side of the cross-arm at each end weakens the arm but little, and as side holes for through bolts and brace bolts must be drilled in manufacture, there is no increase in cost due to the drilling of the space-bolt holes. On the other hand, if this work is done in the field the drilling is more expensive and is less likely to be done evenly. This is particularly true where it is desired to double-arm an existing single arm, and the work must be done on the pole. Where second-hand arms are reinstalled it will be found that the old field-drilled space-bolt holes seldom match, and new ones



SIX-PIN ARM WITH SPACE-BOLT HOLES AT ENDS

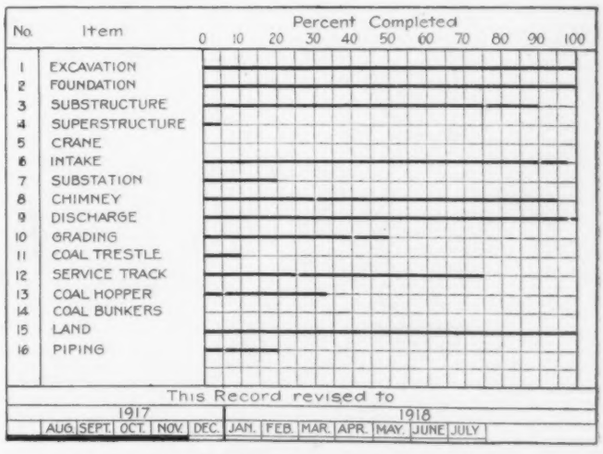
must consequently be drilled. With factory-drilled holes these difficulties are avoided.

It is found good practice to place the double-arming bolts 5½ in. (14 cm.) from the cross-arm ends. In N. E. L. A. standard four, six and eight-pin arms this puts the space bolts through the arm 1½ in. (3.8 cm.) inside of the center line of the outside pins, as shown in the accompanying illustration.

COMPACT CENTRAL STATION CHART TO RECORD PROGRESS

Method Is Found to Be Inexpensive, as an Original Tracing Can Be Altered at Any Time When This Is Desirable

A convenient progress chart used by the Turners Falls Power & Electric Company in connection with the construction of its new steam-turbine plant at Chicopee, Mass., is shown herewith. Work on the superstructure to Dec. 1, 1917, was classified under seventeen items from excavation to piping, the percentage of completion at any time being shown by solid heavy lines with breaks for monthly separation, together with the revision data. Two 15,000-kw. units will be first installed, but these have not yet appeared on the chart. The



INEXPENSIVE PROGRESS-RECORDING CHART USED IN A CENTRAL STATION IN A MASSACHUSETTS CITY

method is very inexpensive, as an original tracing can be altered at any time and new prints made to show conditions even under rapid changes.

R. E. Barrett is resident engineer in charge of the construction of the new steam-turbine plant of the Turners Falls Power & Electric Company.

CENTRAL STATION SERVICE

A Department Devoted to Commercial Policy and Management Topics, Including Applications of Electric Light, Power and Heat

IDEAS THAT UNDERLIE NEW HEADQUARTERS FOR UTILITY

How the Lobby of a New Building for the Minneapolis General Electric Company Was Constructed to Help Carry Out Company Policy

Larger quarters for the Minneapolis (Minn.) General Electric Company were made necessary when the company so far outgrew its former housing that ordinary routine business could not be handled. In designing the new quarters the company's executives did not overlook the fact that the place in which several thousand customers pay their bills affords a great opportunity to advertise electric appliances. The lobby of the new building was designed to take care of these opportunities.

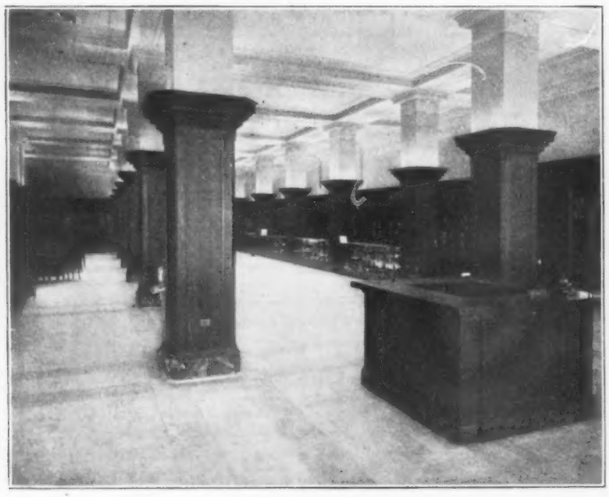
It is not the company's policy actively to engage in merchandising, but rather to do all it can toward advertising appliances. This does not mean that the company will not sell appliances. It does mean, however, that it pays more attention to making an attractive and impressive display and to interesting the thousands of people who visit the lobby each month than to the actual sale of devices from its own shop. That this plan works as intended is shown by the fact that dealers constantly tell the company of inquiries from buyers who have seen some device at the electric company's shop.

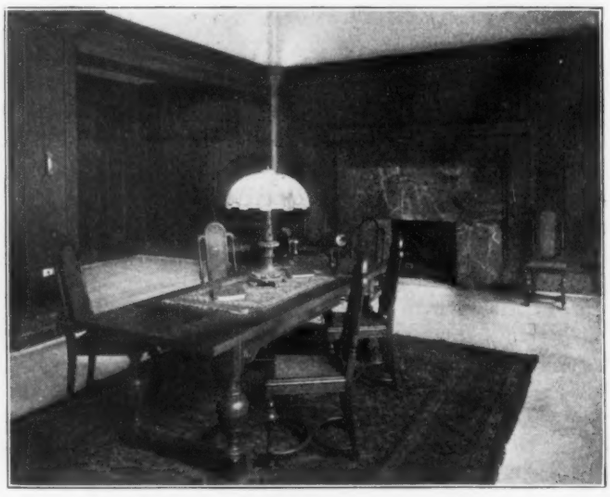
The company does not cut prices, sell on installments, employ any system of mail solicitation, or employ salesmen to sell appliances outside the showrooms. List prices are maintained. A co-operative advertising service is issued with the bills. In this service each local dealer may advertise and is billed for the space he occupies at the exact cost of the space. The central station takes no space on this advertisement, but gives it all over to dealers. On the lobby floor there are displayed a number of the larger electrical devices, such as washing machines, mangles, sewing machines, etc., most of which are placed there by electrical dealers for demonstration purposes. In this way the new lobby has been utilized to apprise patrons of electrical conveniences and to help the local dealers make sales.

Another idea back of the layout of the lobby had to do with the possibility of impressing upon customers the company's policy of interest in their well-being. It has been found that no mistake was made in estimating the advantage the new lobby would give in this direction. To carry out this plan one section of the lobby is fitted as a waiting room, with a large table, ladies' writing desk, telephones, etc. Another feature is the information desk in charge of a competent man prepared to meet the public and not only to impart the desired information but also to give customers the feeling that the company wishes to devote some time to their personal attention. In commenting on this information desk, H. E. Young, sales manager of the company, said:

> We have many inquiries a day at this desk and the conversations which we are able to have with these thousands of people give us a very valuable source of information as to how the public feels with reference to our company. We obtain the opportunity of discovering immediately any complaint which the customer may have and of satisfying it, as well as any criticism which appears to be in the public mind with respect to our activities. It is evident that remarks concerning our business are valuable information for the company to have, as they give very good indications of how our company stands in the minds of a great many persons. By actual records we have found that every day we are able to discover from one to ten instances of customers who have had a more or less wrong impression of our company, and we are able to correct this. It is evident, therefore, that this amounts to several thousand cases of dissatisfaction in a year which have been removed.

Without this spacious and attractive lobby, therefore,





DESIGNING AND FURNISHING THE LOBBY OF THE CENTRAL STATION BUILDING TO ATTRACT CUSTOMERS

thousands of people woud come into our building in a year's time, pay their bills and leave without getting a correct impression of what our company stands for.

One of the most valuable assets of the arrangement of large pieces of merchandise on the floor is the fact that our clerks are able to talk to hundreds of people every month, and not only introduce these devices into the home but show the customer our interest in being of service to him. Here again we run across many opportunities to relieve patrons of some particular misunderstanding they have had with our company and thereby make additional friends.

On the whole, this lobby is a new means of affording us an opportunity to come into proper contact with a great number of people and impress upon them our policy and our attitude. As a result our company will mean a great deal more to them than simply a cold-blooded business institution whose interest stops with the payment of the necessary money for service rendered.

NEW-BUSINESS PROGRAM FOR COMING SIX MONTHS

Appliance Sales and Keeping of Records That Will Assist in Getting Business at Later Date Are Features of Work

Late in the year 1917 the accompanying tentative program of work for the new-business department was worked out for a Wisconsin utility company operating in a city of something less than 30,000 population. The plan was developed with the idea that the activities of the department should be so controlled as to put on the lines business which would increase the income from existing investment and at the same time would pave the way for a big drive after other business at some future time when conditions are more favorable. The plan follows:

I. Make an analysis of appliance market, which involves calling on each individual residence customer, making a record of the appliances that each has, ascertaining whether they are in good condition and are being used. Explain appliances that customers are interested in and endeavor to interest them in appliances which they do not own.

While obtaining the above records:

1. Make record of unwired houses.
2. Solicit all houses on our lines that are wired but not connected, preferably those that have services already attached to the house.
3. Make record of most profitable line extensions, possible number of customers, etc., so that they can be given attention when we are in a position to make such extensions.
4. Make a record of customers having a minimum monthly bill, using these as "prospects" for additional appliances.
5. Especially solicit the custom of "long-hour burners," such as barber shops, pool-rooms, saloons, restaurants, hotels, confectionery stores, cigar stores, drug stores, etc., that use gas lighting.
6. Offer suggestions to other merchants for the improvement of their installations, endeavoring to raise the standards of illumination.
7. Keep in close touch with the various isolated plants, learning of their breakdowns, etc., and getting any information which might assist us in selling them breakdown or complete service.
8. Make a record of power installations also in industrial appliance installations which should be of use to us in obtaining additional business along these lines.

II. Care for all complaints which are turned over by the accounting department or otherwise directed to this department for adjustment.

III. Salesroom: Call the attention of all people who sign applications at the office or come there to make complaints to our line of appliances, explaining appliances which are apparently new to the customer. If unable to sell them, take their names as "prospects."

Make exchange of Gem lamps. Keep record of incandescent lamps and appliance sales. Keep record of connections and disconnections, etc.

SCHEDULE FOR EXPENDITURES

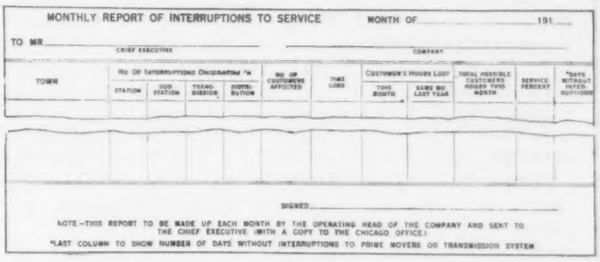
1. Send circular letter to every customer on our lines featuring economy in time and operation, convenience, safety and cleanliness of electrical appliances, to be followed by a series of two or three "follow-up" letters, one of these to feature the practicability of electrical Christmas gifts. Approximate cost.....	$500.00
2. The use of space in one foreign-language and one English-language daily paper, featuring seasonal appliances, house wiring in season, commercial lighting, general policy letters, etc. Approximate cost.....	500.00
3. Arrange for public lecture for woman's club and domestic science classes, together with demonstration of appliances and serving of electrically prepared refreshments. Approximate cost.....	50.00
4. Furnish slides to four moving-picture theaters every week throughout the winter, featuring appliances, etc. Approximate cost	156.00
5. Provide for electric cottage during house-wiring season. Approximate cost	100.00
6. Provide more complete line of window accessories such as glass shelves, pedestals, etc., for window display purposes. Approximate cost	15.00
7. Erect talking electric sign similar to that of Merchants' Light & Heat Company of Indianapolis, also install electric flag. Electric sign and flag to be charged to ten years' advertising. Account for six months.....	20.00
Salaries and commission, approximately.....	1,100.00
Total	$2,441.00

This plan contemplates the expenditure of a sum amounting to about 1.1 per cent of the gross annual revenue of the company, which is about one-half the amount usually expended by the company in this class of work.

INTERRUPTION REPORT TO URGE BETTER SERVICE

Form Shows What Caused Outage and of What Consequence to the Public Service Company Each Interruption Proved to Be

The Central Illinois Public Service Company of Mattoon, Ill., has developed a standard form on which each service interruption is reported to the chief executive. Such a report is made each month and covers the company's entire property, comprising some 190 committees. The report sets forth the location of the trouble both as to the districts affected and as to the particular


MONTHLY REPORT OF INTERRUPTIONS TO SERVICE MONTH OF 191

TO MR. CHIEF EXECUTIVE COMPANY

TOWN	No. OF INTERRUPTIONS OCCURRING IN: STATION	SUB-STATION	TRANS-MISSION	DISTRI-BUTION	NO. OF CUSTOMERS AFFECTED	TIME LOST	CUSTOMER'S HOURS LOST: THIS MONTH	CUSTOMER'S HOURS LOST: SAME NO. LAST YEAR	TOTAL POSSIBLE CUSTOMERS HOURS THIS MONTH	SERVICE PERCENT	*DAYS WITHOUT INTERRUPTIONS

SIGNED

NOTE—THIS REPORT TO BE MADE UP EACH MONTH BY THE OPERATING HEAD OF THE COMPANY AND SENT TO THE CHIEF EXECUTIVE (WITH A COPY TO THE CHICAGO OFFICE).

*LAST COLUMN TO SHOW NUMBER OF DAYS WITHOUT INTERRUPTIONS TO PRIME MOVERS OR TRANSMISSION SYSTEM

A CONVENIENT RECORD OF SERVICE INTERRUPTIONS

portion of the system responsible for the outage. In addition to this it gives the number of customers affected and the time lost. From these data are computed the loss in customer-hours. From these facts and a knowledge of what would constitute 100 per cent perfect service there is computed a percentage representing the degree of perfection attained for that

month. Every outage, even though it is but momentary, is counted as an interruption.

Since reporting of this character has been in force there is a noticeable tendency for employees to endeavor to reduce outages to a much lower minimum, so that the service percentage is usually well above 99 per cent, which leaves remarkably little room for improvement.

THE PUBLIC IS SLOW TO CONSERVE ELECTRICITY

Advertisements Asking Consumers to Aid Company in Combating the Coal Shortage Do Not Bring Quick Action

A Middle Western central station company recently published a large advertisement in one of its local Sunday papers setting forth the exact conditions which confronted the company and laying special emphasis upon the necessity for its patrons to conserve electricity. Part of the contents of the advertisement are given herewith.

In commenting upon the use of this advertising the executives of the company said:

"The most good from such an advertisement is in informing the public of the actual conditions that exist. The public usually responds very slowly to such requests.

"We have since the publication of the advertisement sent personal representatives about the city making the request directly to our consumers. Moreover, the local United States Fuel Administrator assisted in endeavoring to create interest in conservation. The best we can say, however, is that the public will co-operate with the central station very reluctantly. This does not mean that it did not co-operate, but it means that it has been slow in realizing the importance and absolute necessity of co-operation."

SHORTAGE OF ELECTRICITY

FOR POWER, LIGHT AND STREET RAILWAY PURPOSES

Electric Power Shortage

The electric power situation in ——— and the surrounding territory served by this company has become more acute. This is due to the fact that the existing equipment in our power stations cannot be operated at its full capacity because we have been unable to procure a good grade of coal. However much we may regret our inability to meet the demands upon us—and we most certainly do regret it—the situation must be squarely faced and steps taken to conserve the supply of electricity.

We request those who use electricity for power purposes to give their most earnest consideration to ways in which they can make a saving of current in their business.

We request those who use electricity for lighting purposes to burn fewer lights. Use only one light where formerly two were used.

The foregoing request is made only with a full knowledge of the gravity of the situation, and because we wish to render to all our patrons the best service which the circumstances will permit.

Our Coal Troubles

The coal we are now receiving is of the most inferior grade we have ever had experience with. Our firemen jokingly refer to it as "fireproof" coal because it is so full of dirt that it will barely catch fire. In fact, some actually had corn growing in it as it stood in the car when received, and tests made of the coal have shown it to contain as high as 26 per cent of non-combustible material.

It has been due to this fact that several times recently we have been forced to discontinue service to power customers, to operate cars at half speed for short periods and to operate a reduced number of tripper cars during the rush hours. The poor grade of coal makes it utterly impossible to operate our boilers at capacity and lowers the output of our power station system.

The present serious situation prevails throughout the country—this community is not alone in difficulty, but this company without help cannot attain the desired results. Relief can come only with your immediate and persistent co-operation.

ELECTRICITY VIEWED AS THE ALLY OF AMERICA

Opportunity at Hand for Central Stations to Give Publicity to the Essential Character of the Electric Lighting Industry

In both the Christmas and New Year's special editions of the Salt Lake City papers the Utah Power & Light Company ran the accompanying advertisement calling attention to the part electricity is playing in winning the war.

The public is not apt to think much of the part that individual industries are taking in this world struggle unless the facts are brought to its attention. Had it

ELECTRICITY—AMERICA'S ALLY
Have you stopped to think what Electricity means to America in this war?
It turns the wheels of nearly a million factories; lightens labor in ten million homes; brings ease and comfort into the daily lives of a hundred million people. In the pursuits of peace it is man's ally; but when war appears, it becomes a veritable brother to Mars
In helping to carry on the great war the Electrical industry is "doing its bit." Tireless, day in and day out, the Electrical men of this nation are marshaling the forces of heat, light and power for your greater efficiency and benefit
We are doing our utmost to cut out waste and make our service as efficient as possible for your use and for the nation's.
Whatever your part in this great cause, remember your own personal responsibility. Remember Electricity. Make the best use of this greatest of all helps
UTAH POWER & LIGHT CO.

ELECTRICITY IN THE WAR FOR DEMOCRACY

not been for the large amount of publicity it is doubtful if the people of the United States would attach such importance to the shipbuilding industry, and the same is true of other great industries. Of no less importance or value is the electrical industry. The munition plants, the shipbuilding plants, the steel plants and all of the other great war plants depend on electricity to turn out their products.

Of this fact, however, the great public of the United States is not aware. It does not know because it has not had the opportunity to learn. Central stations have here the chance to create good-will and better public relations, besides helping the public to understand the war value of the electric lighting utility.

TECHNICAL THEORY & PRACTICE

Including a Digest of Important Articles Appearing in the Scientific and Engineering Press of the World

Generators, Motors and Transformers

Methods of Cooling Transformers.—ARTHUR PALME.—Starting with the early dry type of transformer, which depended upon natural draft to dissipate the heat generated in its windings and core, the author discusses the different types of transformer tanks that have been developed to meet the ever-increasing size and changing operating conditions of transformers—a development which has made possible the modern 8000-kva. self-cooling and the 14,000-kva. water-cooled, oil-insulated transformers.—*Power*, Dec. 25, 1917.

Static Transformer Construction.—G. HARLOW.—This subject is discussed under the following heads: Efficiency, subdivided into iron and copper loss; temperature rise; short-circuit conditions and regulation; magnetizing current; flash test and insulation of end turns, and quality of oil.—*Commonwealth Engineer*, Oct. 1, 1917.

Lamps and Lighting

Light Distribution from Projectors.—WALDO C. COLE.—The problem of just what light may be expected from a parabolic reflector under practical conditions is one which it is possible to work out mathematically, as is pointed out in the article. From these calculations it is obviously possible to figure out in advance just how many lamps would be needed to illuminate a given area to a given intensity.—*Journal of Electricity*, Dec. 15, 1917.

Electric Car Lighting.—This article gives a summary of the best practices of representative steam railroads in this country on the important subject of electric car lighting.—*Railway Electrical Engineer*, December, 1917.

Generation, Transmission and Distribution

Gas-Firing Boilers.—T. M. HUNTER.—The author brings out the fact that the gas firing of boilers now has a greater future than ever. Probably the time is not so far distant when the present method of burning coal, together with its valuable by-products, will be considered obsolete and possibly even illegal. It will then be replaced by some type of by-product or coal-distillation plant yielding gas, and this gas will without doubt be largely used for boiler-firing purposes.—London *Electrician*, Dec. 7, 1917.

Electrical Energy from Brown Coal.—Tests made by the City Council of Melbourne, Australia, in a furnace constructed along the lines of a Dutch oven indicate that there will be no difficulty in burning brown coal. With the use of a thick fuel bed a semi-producer form of combustion takes place, the volatile matter and moisture being driven off early and the former burned in the upper part of the furnace by the aid of the air admitted at the bridge. The tests proved that the boiler capacity as rated on the basis of black coal consumption was more than fully maintained with brown coal.—*Commonwealth Engineer*, Nov. 1, 1917.

General Utilization of Pulverized Coal.—H. G. BARNHURST.—From the author's presentation of this subject, there are no insuperable difficulties to overcome in the use of pulverized coal, but merely those which have always hampered the introduction of new methods. Pulverized coal is here to stay, for it is very closely allied to the conservation of national resources.—*Journal Engineers' Club of Philadelphia*, December, 1917.

Traction

New Cars for the Melbourne, Brunswick and Coburg Tramways.—STRUAN ROBERTSON.—Description of light-weight cars that give reasonable seating accommodations for use on this system. The main dimensions and particulars of the cars are given as well as the wiring diagram of contactor connections.—*Commonwealth Engineer*, Oct. 1, 1917.

Handling Electric Locomotives and Motor Cars.—An article on the methods used by representative roads to maintain electric rolling stock and train enginemen.—*Railway Electrical Engineer*, December, 1917.

Installations, Systems and Appliances

Annual Load-Relief Map—Peak-Load and Load Factor Analysis.—WILLIAM LEROY ROBERTSON.—This is a description of an annual load-relief map which is a device for visualizing the entire yearly load of central stations. A review of load characteristics, as exemplified by the annual load-relief map, is included. Notes on daylight saving relative to the decreasing of peak load and improvement in load factor are given. The article also includes an analysis of load factors as applied to base and top loads, demonstrating the large amount of idle capacity peculiar to central stations. The annual load-relief map is valuable in the study and exemplification of all matters having to do with the central-station loads.—*Proceedings A. I. E. E.*, December, 1917.

Electrical Cooking as Applied to Large Kitchens.—W. A. GILLOTT.—The author considers the future of this branch of electrical industry to depend, first, upon close co-operation between the supply company's engineer and the manufacturer, and, secondly, upon the interchange of ideas and experiences. He also points out that in drawing up a scheme for cooking in large kitchens the essential items are reliability, quick service and efficiency. When the working comparisons are considered electricity has sufficient advantages to outweigh any difference in capital cost. These are: (1) cleanliness and absence of fumes; (2) constant heating value; (3) reduced labor costs; (4) less floor space required; (5) economy in food; (6) saving on the renewal of kitchen utensils.—London *Electrician*, Dec. 7, 1917.

Conveyors and Elevators.—W. H. ATHERTON.—The development of the conveyor and elevator for the handling of coal is first outlined, and then the various requirements are considered in detail. Sufficient coal

storage is a vital matter for the power station and introduces problems which are conveniently solved by conveyors. The various types of conveyors and elevators for coal handling and ash handling are considered in some detail, and reference is also made to the suction method of removing ashes.—London *Electrician*, Dec. 14, 1917.

Small Electric Furnaces and Their Uses.—CHARLES R. DARLING.—The author describes typical forms of modern electric furnaces as well as the question of the best methods to follow in operating them.—London *Engineer*, Nov. 16, 1917.

Extensive Use of Heating Appliances in Switzerland.—Reports from various central stations in Switzerland emphasize an enormous increase in the use of electricity for private cooking and heating. The use of electricity for these purposes (coming at the time of day where demands for lighting are low) would be far greater if sufficient electrical cooking and heating appliances could be obtained from other countries. Switzerland looks to America to supply this need if arrangements for the exportation can be made in the United States.—*Schweizerische Wasserwirtschaft*, Nov. 10, 1917.

Charging Machines.—FRED G. SMITH.—Reference is made particularly to the use of charging machines in steel works. Such machines lead to a large saving in labor, as shown by typical cost figures. Owing to the number of independent movements that are required, the wiring is somewhat complicated and requires careful study to avoid annoying breakdown. Also, owing to severe conditions of service, the construction must be rugged. Illustrations are given of up-to-date machines.—London *Engineering*, Dec. 14, 1917.

Electric Heating of Industrial Plants.—F. RUTGERS.—In Switzerland coal is so expensive and the heating demands of industrial establishments so erratic that tests carried out in some plants with electric heaters supplied with hydroelectric energy have shown their desirability even at lower coal prices than obtain at present. Where live steam has to be used for heating it is at present nearly twice as expensive as electric heating from hydroelectric sources. Rooms which are rarely visited by employees can be maintained at medium temperatures simply by warming them during off-peak periods. Where a greater warmth is needed, as in workrooms, 20 to 40 calories are required for each cubic meter on cold winter days, and 15 to 25 calories on milder days. The heat produced by 1 kg. of coal as steam for heating is equal to 5 kw.-hr. to 5.5 kw.-hr. In one textile plant where air required for the drying of the yarn was formerly sent through masonry conduits past steam pipes and heated to 65 deg. it is now heated by eighteen electric resistance heaters. They are connected in series of three to one phase of a two-phase system. Behind the heaters are wire nets which are intended to catch and retain glowing particles or sparks in case of a short circuit. The air is heated to 55 deg. with an energy consumption of 200 kw. If necessary, the electric installation can handle more air and use 300 kw. This represents an hourly production of 258,000 calories. The installation was built by the Oerlikon Machine Manufacturing Company of Zurich and has given excellent satisfaction.—*Schweizerische Bauzeitung*, Nov. 24, 1917.

Wires, Wiring and Conduits

Calculating Electrical Conduits.—CURCHOD.—A method for the rapid calculation to an approximation sufficient in practical work of the section of copper conductors. Use is made of simple diagrams which represent the sections for different current strengths.—*Revue Générale de l'Electricité*, Nov. 24, 1917.

Electrophysics and Magnetism

Total Emission of X-Rays from Certain Metals.—C. S. BRAININ.—A study has been made of the total intensity of the X-ray emission from six metals, platinum, tungsten, silver, molybdenum, copper and cobalt, over a range of voltages extending from 5000 volts to about 33,000 volts. The relations between the energy radiated and the voltage and between the energy and the atomic weight were investigated; this includes a test of the validity of the equation $E = KAP^3$. Below 20,000 volts approximately the energy radiated by platinum and tungsten was found not be proportional to A and P^3; above this voltage, however, it was in agreement with the above equation. Molybdenum obeyed this relation throughout the range of voltages, and showed no deviation from this relation when the voltage was increased above the critical voltage from the K radiation. Copper and cobalt seemed to obey this relation below their critical voltages for the K radiations, but above those voltages their emission increased more rapidly than is required by the "voltage squared law." Silver also obeyed this law below the critical voltage for its characteristic K radiation, but above that voltage the emission energy increased less rapidly than is required by the "voltage squared law."—*Physical Review*, November, 1917.

X-Rays and the Structure of Crystallized and Amorphous Carbon.—Debye and Scherrer find, by the method of X-ray examination which they have perfected, that graphite and amorphous carbon are not essentially different, and that amorphous carbon is only graphite in so fine a subdivision that it is impossible to produce it by mechanical means.—London *Engineering*, Dec. 7, 1917.

Telegraphy, Telephony and Signals

Loading Coils Versus Repeaters.—W. N. FURTHMAN.—The author points out that properly designed and correctly installed loading coils are adequate for all long-distance work. In discussing the principles and uses of repeaters or amplifiers, it was pointed out that they are not absolutely required in transcontinental service.—*Telephone Engineer*, December, 1917.

Miscellaneous

England's and Germany's Faith in Electricity.—It is reported that great reliance is placed on intensive development of electric power by Germany as a means toward rapid reconstruction of industrial prosperity. According to the London *Electrical Industries*, England too feels confident of her electrical position. This journal says: "England is the most favorably situated country in the world for deriving public and private benefit from electrical progress. Our population is more conveniently distributed; our fuel supply is far richer and more accessible. England can if she chooses have a supply of electricity, laid on practically everywhere like water, cheaper than Germany or any other big country on earth, and with this priceless blessing

England can not only defy competition in a wide range of manufacturing industries but can bring about a wonderful revival of agriculture and abolish domestic drudgery. Whatever Germany can do we can do twice as well in this field if only our people will drop their pettifogging parochial notions of electrical development and support the establishment of single-minded administration from a broad national standpoint."—London *Electrical Industries*, Dec. 5, 1917.

New Method of Increasing the Evaporation in Boilers.—CARL HERING.—A new thermal principle in the boiling of water is described. The thin film of gas on the flame side of the water-boiling vessel offers an enormously high resistance to the flow of heat. By means of lugs on the flame side of the surface an artificial thermal resistance is established, which greatly increases the flow of heat, provided that these lugs are always proportioned in the proper manner.—*Power*, Jan. 1, 1918.

The Automatic Disposal of Ashes from Power Houses by Means of Ropeways.—J. WALWYN WHITE.—Although the immediate removal of ashes from the power house can be secured by various means, such as conveyors, telphers, suction plant, etc., the range of action of such devices is comparatively limited. If transportation over some distance is desired, then the problem is most easily solved by means of the ropeway. Such plant is efficient and costs but little in operation. A number of ropeway installations especially adapted for this purpose are described.—London *Electrician*, Dec. 14, 1917.

A Physical Interpretation of Entropy.—J. LAROUSSE.—This article has both a didactic and a technical interest—didactic because the author shows that entropy is, at least theoretically, measurable as a quantity of heat and is not merely a "colossal abstraction"; technical because the process of reasoning that is followed makes an excellent basis for the formulation of a simple and clear theory of thermal machines.—*Revue Générale de l'Electricité*, Dec. 1, 1917.

Use of Aluminum in the Electrical Industry.—JEAN ESCARD.—The author compares aluminum with copper conductors, finding that the former are less easily broken, by reason of their greater specific heat and greater surface radiation; that they have 1.67 times the conductivity of copper of the same weight; that insulation is less effective with aluminum because of its greater diameter, though this is a negligible consideration; that aluminum will withstand a heat intensity one-seventh greater than copper, and that from the point of view of susceptibility to puncture experience shows that with equal insulation fatigue it is possible to reduce the thickness of the insulating material when aluminum wires are used—an important factor in price reduction and a compensation for the increased diameter of the conductor. In winding armatures, etc., aluminum has the advantage that bare wire can be employed. Other uses are for electrodes for arc lamps (these are made with platinum points); for connecting wires between the interior filaments of incandescent lamps and the exterior contacts; in the manufacture of cells and batteries, and in making lightning arresters composed of one or more series of aluminum cones or conic basins filled with an electrolyte.—*Revue Générale de l'Electricité*, Dec. 8, 1917.

Cost of Electric Pig Iron.—Based on experiments at Trollhättan, 4 tons of pig iron should be produced per kilowatt-year in a plant using only one furnace, measuring the energy at the furnace. Figured on the amount of energy purchased, the output should be about 3.32 tons per kilowatt-year. Better results may be expected from a plant of two, three or four furnaces. With a plant of four furnaces, it is assumed that an efficiency of 92 per cent can be attained, and with two or three furnaces between 83 and 92 per cent respectively.—London *Engineering*, Dec. 14, 1917.

Books Received

EVERYMAN'S CHEMISTRY. By Ellwood Hendrick. New York: Harper & Brothers. 374 pages.

MECHANICAL PROCESSES. By G. W. Danforth. Annapolis, Md.: United States Naval Institute. 424 pages, 268 illustrations.

BUSINESS LAW FOR ENGINEERS. By C. Frank Allen. New York: McGraw-Hill Book Company, Inc. 291 pages. Price, $3.

EMPIRICAL FORMULAS. By Theodore R. Running. New York: John Wiley & Sons, Inc. 144 pages, illustrated. Price, $1.40.

THE LIGHTING ART. By M. Luckiesh. New York: McGraw-Hill Book Company. 230 pages, 43 illustrations. Price, $2.50 net.

APPLIED MOTION STUDY. By Frank G. Gilbreth. New York: Sturgis & Walton Company. 220 pages, illustrated. Price, $1.50, net.

PRACTICAL ELECTRICITY. By Terrell Croft. New York: McGraw-Hill Book Company, Inc. 646 pages, 548 illustrations. Price, $2.50.

ELECTRICAL ENGINEERING. By Clarence V. Christie. New York: McGraw-Hill Book Company, Inc. 546 pages, 508 illustrations. Price, $4.

ELECTRICAL MEASUREMENTS. By Frank A. Laws. New York: McGraw-Hill Book Company, Inc. 720 pages, 442 illustrations. Price, $5.

HYDROELECTRIC POWER STATIONS. By Eric A. Lof and David B. Rushmore. New York: John Wiley & Sons, Inc. 822 pages, 408 illustrations. Price, $6.

PRACTICAL PYROMETRY. By Ervin S. Ferry, Glenn A. Shook and Jacob R. Collins. New York: John Wiley & Sons, Inc. 148 pages, 73 illustrations. Price, $1.50.

THE ELEMENTS OF ELECTRICAL ENGINEERING. Vol. I. By William S. Franklin. New York: The Macmillan Company. 465 pages, illustrated. Price, $4.50.

THEORY AND CALCULATIONS OF ELECTRICAL APPARATUS. By Charles P. Steinmetz. New York: McGraw-Hill Book Company, Inc. 480 pages, 227 illustrations. Price, $4.

ENGINEERING MATHEMATICS. A Series of Lectures Delivered at Union College. By Charles Proteus Steinmetz. New York: McGraw-Hill Book Company, Inc. 320 pages, 110 illustrations. Price $3.

RADIO-COMMUNICATION: THEORY AND METHODS WITH AN APPENDIX ON TRANSMISSION OVER WIRES. By John Mills. New York: McGraw-Hill Book Company, Inc. 205 pages, 120 illustrations. Price, $1.75 net.

NEWS OF THE INDUSTRY

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields

"COAL BUDGET" PLAN OF FUEL ADMINISTRATION

Vital Coal Needs of Public Utilities to Be Met 100 per Cent, but Consumers of Power to Be Asked to Curtail

The new "coal budget" plan of the United States Fuel Administration, announced in Washington this week, will not adversely affect the electrical industry, speaking broadly, according to statements made personally by Fuel Administrator Garfield to the Washington correspondent of the ELECTRICAL WORLD.

In discussing the new plan, Dr. Garfield pointed out that the statement outlining it, made public on Jan. 8, specifically promises that the coal needs of public utilities, such as power companies, will be filled at the rate of 100 per cent.

That there will be a curtailment of the supply of coal and consequently of power, however, is apparent by a reading of the statement and an analysis of the plan made by other Fuel Administration officials for the correspondent of the ELECTRICAL WORLD. In a few words, the intention of the plan is to cut down on non-essential production, so as to save coal. Thus all industries not absolutely essential to the conduct of the war, but which use electrical energy for power in manufacture, are being asked to curtail their production, and in that way there will be a curtailment of power and consequently of coal.

The brewing industry, as well as industries engaged in producing paint and varnish, wall paper, confectionery, artificial ice, boxboard and glassware, have already made voluntary reductions in production, and to the extent that electrical energy is used in these industries there will be a saving of power and of coal.

The Fuel Administration is now asking that all other industries which can cut down production of materials not essential for winning the war send representatives to Washington for conferences and announcement of patriotic purpose in curtailment of production. It is thought that in this way a reduction between 36,000,000 tons and 50,000,000 tons in 1918 is possible.

The official statement in regard to the plan promises that "fuel needed in 1918 for army and navy purposes, for munition works, for public utilities, for domestic consumers and for factories working on war material will be furnished to the extent of 100 per cent."

Dr. Garfield was asked whether the new "coal budget" plan of giving such public utilities as power companies 100 per cent of their coal requirements means that the Fuel Administration has now worked out a permanent policy for the treatment of the electrical industry for the duration of the war.

"Not in regard to electric lights," he answered. "That subject will be handled by the state administrators in the several communities in accordance with conditions in the various sections of the country."

EXECUTIVE COMMITTEEMEN OF CONTRACTORS' ASSOCIATION

Members Elected by Divisions to Perfect the Formal Organization of the New Association at St. Louis on Jan. 22

In preparation for the organization meeting of the new executive committee of the National Association of Electrical Contractors and Dealers to be held at the Missouri Athletic Club, St. Louis, on Jan. 22, as stated in last week's issue of the ELECTRICAL WORLD, members have been elected by the broad divisions provided for under the constitution. The newly elected members of the executive committee, as announced thus far, are:

Central Division.—Two years: G. M. Sanborn, Indianapolis, chairman; J. A. Fowler, Memphis; J. E. Sweeney, Waterloo, Iowa. One year: Robley S. Stearnes, New Orleans; W. I. Gray, Minneapolis; J. N. Pierce, Chicago.

Atlantic Division.—Two years: W. C. Peet, New York, chairman; W. K. Tuohey, Springfield, Mass.; M. E. Arnold, Philadelphia. One year: George M. Chapman, Waterbury, Conn.; T. H. McKinney, Atlanta, Ga.; Paul H. Jaehnig, Newark, N. J.

Pacific Division.—Names not yet announced.

CHICAGO MAY REDUCE INSPECTION DEPARTMENT

Electrical Inspection Department Claims to Be Self-Supporting and Declares There Is Still Much Inspection Work to Be Done

The Chicago City Council, in order to keep expenses within resources, has proposed, among various methods of retrenchment, to dispense with services of some electrical inspectors. This is evidently based upon decline in new building operations. Victor H. Tousley, chief electrical inspector, objects to such action being taken, declaring that the inspection bureau is self-sustaining and that its duties do not depend on building operations, but are largely concerned with the wiring of old buildings, with additional power and light installations in industrial plants, with constant reinspections to insure that safe work continues safe, with the oversight of illuminated signs, and with investigation of accidents and fires.

"At no time," Mr. Tousley said, "can any community afford to dispense with such a feature of prevention of loss of life and property as is represented by its electrical inspection bureau, especially when that bureau is self-supporting. At this time, and in a commercial and railway center such as Chicago, the thought of reducing such a bureau is beyond the understanding of those who are aware of the extreme dangers attached thereto. This is the time that the husbanding of all resources is of vital interest to the nation."

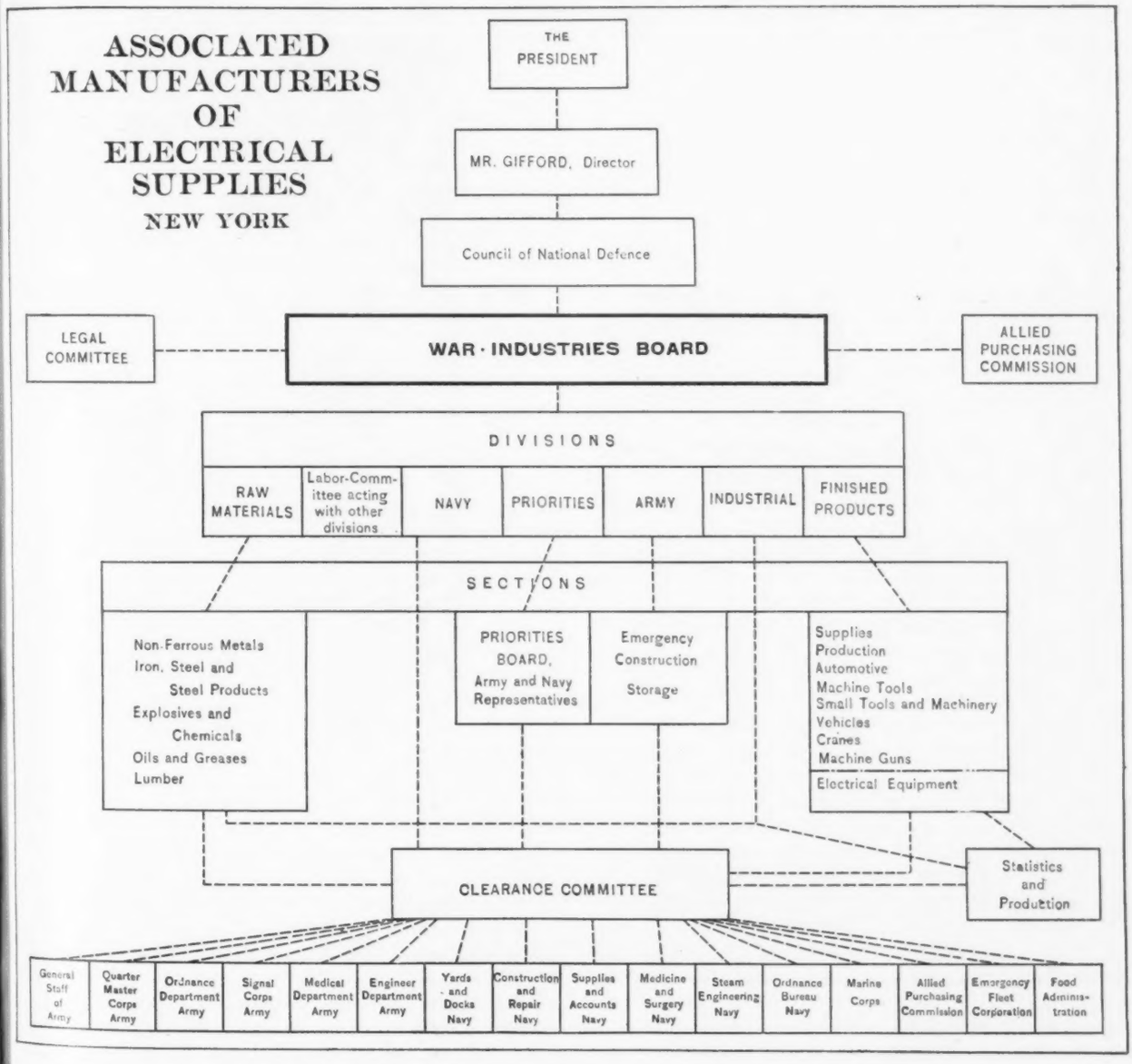
MANUFACTURERS' COMMITTEE PERFECTS WAR ORGANIZATION

Federal War Service Committee of Electrical Manufacturing Industry Elects Chairman and Secretary-Treasurer

Permanent organization of the General War Service Committee of the Electrical Manufacturing Industry has been effected by the election of Robert K. Sheppard, Simplex Wire & Cable Company, as chairman, and W. W. Nichols, Allis-Chalmers Company, as secretary and treasurer. Mr. Sheppard is a representative of the Associated Manufacturers of Electrical Supplies on the general committee; the other representative of this association on the general committee is J. R. McKee, General Electric Company. Mr. Nichols is a representative of the Electrical Manufacturers' Club on the general committee; the other representative of that club is C. A. Terry, Westinghouse Electric & Manufacturing Company. The representatives of the Electric Power Club on the general committee are Clarence L. Collens II, Reliance Electric & Engineering Company, and J. C. Hobart, Triumph Electric Company.

Mr. Sheppard and Mr. McKee, as stated, represent the Associated Manufacturers of Electrical Supplies on the General War Service Committee of the Electrical Manufacturing Industry. The war service committee within the Associated Manufacturers of Electrical Supplies is composed of Mr. Sheppard as chairman; Mr. McKee, H. W. Bliven, Harvey Hubbell, Inc.; Le Roy Clark, Safety Insulated Wire & Cable Company, and Charles L. Eidlitz, Metropolitan Electric Manufacturing Company.

The accompanying diagram has been presented at the various meetings of the Associated Manufacturers of Electrical Supplies to indicate the broad scope of the organization which has been developed at Washington to provide for government needs. The War Industries Board is designed to co-ordinate the activities of the various government departments.



UNOFFICIAL DIAGRAM SHOWING IN SKELETON FORM THE ORGANIZATION OF THE WAR INDUSTRIES BOARD AS OF DEC. 6, 1917

RATE INCREASE IN COAL CLAUSE IN READING, PA.

Amendment to Schedules of the Metropolitan Edison Company Providing for Changes with the Cost of Coal

The Metropolitan Edison Company, Reading, Pa., has filed an amendment to its rate schedule, adding a coal clause, making changes in rates as follows:

The rates provided in Schedules G, I, K, L and M are based upon a price of $3.25 for one ton of 2240 lb. of bituminous coal, delivered at the plant of the power company. Should the power company be obliged to pay more than $3.50 per ton for coal delivered, for every additional 25 cents per ton in excess of said sum of $3.50 the rate will be increased by an additional sum of $0.00028 per kilowatt-hour of electricity consumed. In like manner, for every 25 cents paid per ton less than $3 per ton, the rate shall be reduced $0.00028 per kilowatt-hour of electricity consumed. Increases or decreases shall be calculated in 25-cent units only and fractional parts of said units shall not be considered.

The average price of coal, to be ascertained semi-annually on June 30 and Dec. 31 of each year from the books of the power company, and the increase or decrease of the cost of coal for the preceding term shall be the basis for ascertaining and fixing the amount of increase or decrease to be paid for electricity per kilowatt-hour during the next succeeding period or term of six months.

STATION INTERCONNECTION IN THE TEUTONIC EMPIRE

Progress in Linking Up Generating Systems in Central Europe as Well as in This Country and England

Numerous articles and editorials in the ELECTRICAL WORLD have told of the progress of plans for interconnection of generating stations in this country, which are being accelerated by the demands of war. The following translations from Central European papers indicate that a similar movement is in progress in the Central Powers:

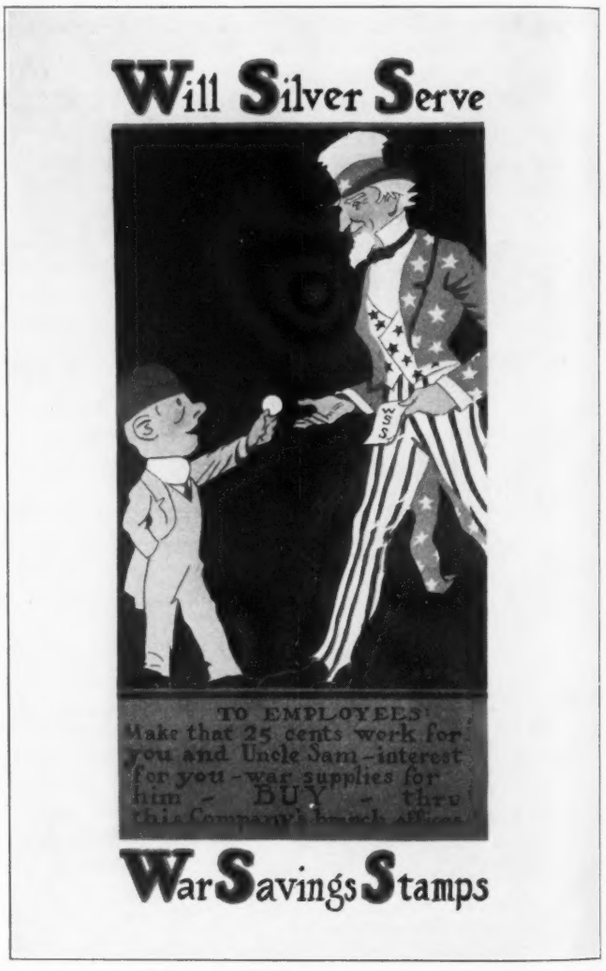
According to the Stuttgart *Neues Tagblatt*, a meeting of representatives of all electric central stations in Württemberg, Germany, was held recently at Geislingen, at which it was decided to unite under a single management. Lines will be laid interconnecting the various power houses, and arrangements will be made for the most effective and economical production and distribution of the energy generated. A committee of representatives has been appointed to work out details for the incorporation of a separate distributing company which will handle the entire production and assign the quantities of energy to be produced by each. Although this situation has been created by the extraordinary war conditions, it is the intention of the committee to make the arrangement permanent if it proves satisfactory.

A bill has been passed in the Hungarian parliament, says the *Budapester Hirlap*, providing for the combination of all electric central stations of the country into one huge organization. A central management is to take hold of the work, and all cities and towns in Hungary will receive energy for lighting and power from it. The main object is to relieve power houses which are overworked and to assist those in which demand is not equal to the available supply.

NEW YORK COMPANIES SELL THE WAR SAVINGS STAMPS

Complete Organization at Branch Offices Effected Through a Gas and Electric Light, Heat and Power Group

Upon receipt of a communication from President J. W. Lieb of the National Electric Light Association, the New York gas and electric companies placed their facilities at the disposal of the New York director of the National War Savings Committee. Every one of the twenty-seven gas and electric companies in the metropolitan district has placed the war savings stamps on


Will Silver Serve
TO EMPLOYEES:
Make that 25 cents work for you and Uncle Sam—interest for you—war supplies for him—BUY—thru
War Savings Stamps

WAR-SAVINGS-STAMP POSTER USED BY UTILITY COMPANIES

sale at every office visited by consumers. The eleven electric companies are the following: Bronx Gas & Electric Company, Edison Electric Illuminating Company of Brooklyn, Flatbush Gas Company, New York Edison Company, New York & Queens Electric Light & Power Company, Northern Westchester Lighting Company, Peekskill Lighting & Railroad Company, Queens Borough Gas & Electric Company, Richmond Light & Railroad Company, United Electric Light & Power Company and Westchester Lighting Company.

Organization of the gas and electric companies for the sale of stamps was effected by Frank W. Smith, vice-president and general manager United Electric Light & Power Company, who has been appointed chairman of the gas and electric light, heat and power group for New York. The companies are:

First, acting as agents, offering the stamps at more than seventy offices.

Second, inclosing with bills and correspondence as well as distributing by hand to millions of customers literature describing the stamps and urging the public to buy them. The seventy offices display cards, posters and banners. Employees selling the stamps do not await inquiries, but suggest the purchase of stamps.

Third, bringing the stamps to the attention of employees by numerous articles. There has been appointed a director of war savings societies, whose duty is to encourage formation of these societies among employees, and a director of speakers, who is actively arranging for speakers to address employee organizations.

ADMINISTRATION BILL FOR WATER-POWER LEGISLATION

President Wilson, at Conference with House Leaders, Intrusts New Water-Power Bill to Rules Committee

President Wilson had a conference at the White House on the evening of Jan. 4 with members of various committees of the House of Representatives for the purpose of speeding up action in the House on water-power legislation. The President committed to the care of Representative Pou, chairman of the House rules committee, a member of the delegation which conferred with him, a copy of a new water-power bill, which will be known as the administration bill. This measure is one to co-ordinate legislation proposed for years in both houses of Congress dealing with water power not only on the public domain but in navigable streams; and the result of the White House conference, it is authoritatively stated in Washington, will be that the House rules committee will bring in a rule peremptorily requiring the House of Representatives to vote on and pass water-power legislation at an early date.

FINAL SHAPE OF LEGISLATION UNCERTAIN

What is to take place in regard to water-power legislation in the Senate is not yet known. That body passed the Shields water-power bill, a digest of which was printed in the ELECTRICAL WORLD of Dec. 22, page 1206, on Dec. 14, and there is a difference between that measure and the administration measure. The Shields measure, in fact, amends the act of 1906 to regulate construction of dams across navigable waters and does not deal with water powers on public lands. These are handled by a different Senate committee from the committee on commerce, which reported the Shields bill favorably. Many committees of both House and Senate have dealt with many different phases of proposed water-power legislation, and to this fact more than to any other consideration has been due the delay in passing water-power legislation which was promised to the country among the so-called "administration conservation measures" five years ago.

In the House of Representatives the red tape which has contributed to this delay seems in a fair way to be cut by the Presidential conference of Jan. 4, for President Wilson, who has had many conferences with House and Senate members and their differing committees without obtaining legislation, committed the new administration bill not to the chairmen of any of the House committees dealing with water-power matters, but to the chairman of the rules committee. The President is reported by those who attended the conference to have explained with the greatest tact to the committee chairmen that, in view of the differences, he did not know which committee among the water-power committees to intrust with the bill, and that he would solve the problem by giving it to the rules committee, which, as official Washington views it, carried with it the plain implication, "Pass the bill!"

THE ADMINISTRATION BILL AND THE SENATE

Senators in charge of water-power legislation in the upper House are also expecting to have White House conferences. It is certain that the administration bill will be introduced in the Senate or that its provisions will come before a Senate committee in some form, so that when the House passes the administration bill there may be a conference between the House and the Senate. This will provide an opportunity to mold the differences between the administration bill, the Shields bill already passed by the Senate and any measure relating to public lands which may come from the lands committee of the Senate, in case there is no agreement in the Senate to substitute the administration bill for the Shields bill. It is not at all certain that senators will accept the administration bill, and there are some senators who will not fail to exercise the "I object" made famous by "senatorial courtesy" unless they can be made to see that the country imperatively demands legislation at once because of the coal and power shortage, which was President Wilson's motive in committing the new administration bill to the House rules committee.

Although most of the delay has been due to Congress, some is attributable to opposing views held by Cabinet members. These views have been reconciled in the new administration bill, which provides for a water-power commission composed of the Secretaries of the Interior, Agriculture and War. It provides for an executive officer of the commission, appointed by the President for five years; for the payment of rentals, a feature to which there has never been objection of consequence by any interest, and for licenses for water power on public lands as well as public streams for fifty years.

At the end of the license period the licensee will be allowed to renew the license and remain in undisturbed possession until the proposed commission shall have done one of three things:

1. Issue new licenses under laws applicable at that time.

2. Give licenses to new licensees who shall pay for the original fair value of the property.

3. Take the property over upon paying a fair value, the fair value defined to include all work and main transmission lines, plus severance damages for all property not taken over and damaged by reason of severance.

The new administration measure does not include any allowance for enhancement of values on land or water rights, or for any good will for a going concern, etc. It provides for alteration, amendment or repeal by Congress (Congress expressly reserving such rights), but in case of alteration, amendment or repeal such shall not extend to the licensees who have exercised rights or spent money under the bill.

The bill was drawn by General Black and Colonel

Keller, of the Army Engineer Corps, representing the War Department; Edward C. Finney, water-power expert for Secretary Lane, and former Representative Lathrop Brown of New York, now a special assistant to Secretary Lane, representing the Interior Department, and O. C. Merrill, chief engineer of the Forest Service, representing the Agricultural Department, who compiled several years ago a mammoth report on water-power companies, banking affiliations, etc.

Present at the White House conference on Jan. 4 were Thetus W. Sims, chairman of the House committee on interstate and foreign commerce, who recently succeeded Judge Adamson in that position; Scott Ferris, Oklahoma, chairman of the House public lands committee; Asbury F. Lever, South Carolina, chairman of the House agricultural committee, and Edward W. Pou, North Carolina, chairman of the House rules committee, as well as Finis J. Garrett, ranking member of the House rules committee. Representatives Garrett and Sims, as well as Senator Shields, are Tennesseeans.

At the Presidential conference it was agreed that a committee of five members each from the House committees on interstate and foreign commerce, agriculture and public lands, fifteen in all, should be created to compose differences as to the various bills which have been under consideration heretofore in the House and to bring together such radical views as have been expressed by Representative Ferris during public debate on water powers, with more moderate views of others.

The committee of fifteen, it is felt in Washington, will be aided materially by the fact that after mature deliberation, advice and conference President Wilson himself has presented a bill upon which he believes all can agree.

COAL SHORTAGE STILL SERIOUS IN MICHIGAN

State Administrator, However, Expresses Belief that Abrogation of Priority Orders Together with Government Control of Operations Will Help

The coal shortage in Michigan has been exceedingly serious for the last month, and particularly during the two weeks just ended. By a supreme effort, however, most central stations have been kept in operation and at least partial service has been given. State Fuel Administrator W. K. Prudden and the county administrators have been unsparing in attempts to secure a sufficient amount of fuel.

A luncheon, presided over by John W. Brannan of the Detroit Edison Company, was held at the Detroit Athletic Club on Jan. 4, when heads of twenty-five of the largest coal-consuming factories in Detroit discussed the situation. They objected to having coal furnished from the Indiana fields instead of West Virginia and Kentucky. They contended that Kentucky and West Virginia coal is of much better quality and the freight rate is lower.

So far 913 street lamps have been discontinued in Detroit in order to conserve coal. The Detroit *Free Press* suggested that the number of lamps might be reduced to 8320 and that the city would then be lighted as well as in 1914, with an allowance for an increase of 25 per cent in population since that time. There were 11,074 lamps in use before the discontinuance of the 913.

At Holland the City Council adopted a resolution that the town should have two lightless nights per week, but this was rescinded because of danger from thieves and thugs and the cost of making necessary changes in equipment and lines.

Conditions at Lansing have been very acute and on Jan. 4 it was said that the supply had been practically exhausted, although many orders had not been filled. Many other towns were suffering in the same way.

Administrator Prudden had almost decided to limit hours of saloons, poolrooms, moving-picture shows and vaudeville theaters, and to ask that inside illumination of stores be discontinued after closing time and that churches hold union services.

Mr. Prudden expressed the belief that the abrogation of priority orders will aid materially in securing fuel for the State. He feels that relief will follow operation of railroads under government supervision.

INTERCONNECTION FORECAST BY MASSACHUSETTS BOARD

Power to Order Interconnection of Electric Generating Stations Sought by Massachusetts Commission from the Legislature as War Measure

Important additional powers are sought by the Massachusetts Gas and Electric Light Commission in its recommendations to the 1918 Legislature, including authority to order plant interconnections and to approve certain contracts for electric service.

The commission points out that the shortage and high cost of coal have revealed as never before the importance of cheap and reliable power to industrial as well as to community life. Considerable progress has been made by the companies in tying together electric generating stations, but the board holds that "in a great national emergency a matter so vital to the public interest should not rest entirely on the initiative of the companies."

To prevent unnecessary duplication of investment and to conserve natural fuel resources, the board recommends that it shall have authority after proper proceedings to require the physical connection of power stations and gas works, the supply of gas or electrical energy to other companies and municipal lighting plants, and the shutting down of such power plants and gas works as may be unnecessary, upon such terms and for such periods as may be just and reasonable, and to exercise the right of eminent domain wherever essential.

During the last two years the board devoted 127 days of hearings to arbitration of the price of street lighting furnished by the Edison Electric Illuminating Company of Boston to the city of Boston under a ten-year agreement concluded in December, 1914. The trial involved a very large expense for both city and company, all of which, the commission notes, must be borne sooner or later by the public.

"If, on the other hand, prices tentatively reached," says the commission, "or considered by the parties in such negotiations required the approval of the board before contracts for a term of years become effective, such extra expense would be avoided and such matters might be disposed of more summarily and with as close an approximation of justice to all concerned as after an exhaustive trial involving many disputed factors which

may affect costs, but with respect to the meaning of which even if an agreement be reached with respect to the facts men will honestly differ. Moreover, the local authorities enter upon such a negotiation at considerable disadvantage, rarely having had any experience with the problem." The commission recommends that contracts for street lighting for periods of more than one year should require its approval before becoming effective.

The tendency toward concentration of production of gas and electricity into large, well-located generating plants has made many companies distributers merely and not producers of gas and electricity. The terms upon which such distributing companies purchase gas or electricity are becoming a matter of vital interest to customers dependent upon them, in the opinion of the board, which says:

"Where the companies involved are independently owned self-interest may well be relied upon to obtain proper terms. When, however, the selling and purchasing companies have a common ownership, this element is wanting, and serious injustice may result, not only to the consumers but also to one or the other of the companies which are parties to such transactions. The board, therefore, recommends that contracts for the purchase and sale of gas and electricity between companies having a common ownership require its approval."

BEGIN HEARING ON THE CLEVELAND RATE CASE

Company Officials Contend Before Ohio Commission that Present Rates Do Not Yield Adequate Returns on Property Value

The hearing in the rate case of the Cleveland Electric Illuminating Company was begun before the Ohio Public Utilities Commission on Jan. 3.

Company representatives produced exhibits to prove that 3 cents is an inadequate maximum rate. The array of data apparently took the legal and engineering representatives of the city of Cleveland by surprise, as they asked for sixty days in which to prepare arguments and cross-question company witnesses. General Manager Robert Lindsay of the illuminating company said that a deficit has been shown since 1914, and pointed out that it would be still larger if the 3-cent rate should be adopted. Company officials said they regarded 8 per cent as a proper return on the valuation and that there should be an additional 3 per cent for deferred upkeep. The business at present is not yielding such a return, they said.

The valuation placed upon the company's property by the commission is $19,661,242. The rate will be based upon this valuation unless the Ohio Supreme Court, to which it has been appealed, rules otherwise. The city contends that the commission had no right to allow the company to capitalize $1,112,070 as the cost of attaching business; that it erred in deducting a depreciation of $1,506,237 instead of $2,048,186; that it allowed $2,059,031 for interest during construction, when the actual amount should have been $40,821, and that a mistake was made in not considering the actual cost of the property instead of the theoretical replacement value.

On the application of Director of Law FitzGerald for an extension of time in which to prepare arguments against the exhibits made, the commission set Jan. 29 for a continuation of the hearing. Engineer F. W. Ballard, employed by the city as an expert, will prepare figures to be used in an effort to disprove the exhibits.

STUDYING TO SPREAD THE PEAK-LOAD DEMAND

Meeting of Officials of Utilities with Merchants and Industrial Leaders in Springfield, Mass., to Remedy Fuel Shortage Situation

Plans to spread out peak loads, and thus reduce coal consumption by co-operation, are being discussed by officials of the United Electric Light Company and Springfield (Mass.) Street Railway with local merchants and industrial leaders.

At a recent meeting under the auspices of the Springfield committee of public safety, at the Springfield Chamber of Commerce, Walter L. Mulligan, general manager United Electric Light Company, submitted a company load curve for consideration, and emphasized the need of curtailing consumption, especially between 4 p. m. and 6 p. m., in industrial plants. H. M. Flanders, general manager of the railway; J. O. Halliday, superintendent of transportation, New Haven Railroad, and H. S. Knowlton, New England editor ELECTRICAL WORLD, were among the speakers. Fred T. Ley presided, and E. A. Carter, chairman of the local fuel committee, J. C. Robinson, chairman traffic committee, and R. W. Wright, chairman of the manufacturers' committee of the Chamber of Commerce, offered co-operation.

Mr. Mulligan stated that the United company has about 10,000 tons of coal on hand, sufficient for forty days; 60 per cent of the fuel burned is for power service. The shortage has been aggravated by lack of cars and the unwillingness of mine owners to accept coal prices fixed by the government. Low water in the rivers has curtailed hydroelectric production, both at the United company's plants and in the plants of large companies selling hydroelectric energy, so that the United company now receives only about 700 hp., instead of the 4000 hp. normally to be depended upon from river developments. At Indian Orchard the United company built a coal pocket early last year, costing $70,000, and began purchasing all the coal it could get. Only about 10,000 tons could be obtained, and at an average cost of $6.65, normal prices being about half this. The company's storage capacity in Springfield proper, at its downtown station, is about 6000 tons. On account of inadequate transportation conditions the company had to hire motor trucks to bring coal from Indian Orchard to the State Street station, Springfield, at a cost of $300 per day.

The United company, Mr. Mulligan said, would like to see during the present emergency a larger reduction in sign and window lighting. The total station load on Dec. 17, 1917, on the afternoon half hours beginning at 3 o'clock, was: 3 p. m., 13,500 kw.; 3.30 p. m., 13,350 kw.; 4 p. m., 13,600 kw.; 4.30 p. m., 15,500 kw.; 5 p. m., 18,750 kw.; 5.30 p. m., 15,700 kw.; 6 p. m., 13,600 kw. It is estimated that from 25 tons to 50 tons per day could be saved by cutting off, say, 2000 kw. of the peak between 4 p. m. and 6 p. m. This might be accomplished by early closing of factories.

Mr. Flanders pointed out that the street railway

could not handle traffic if the industrial patronage should be thrown upon it at a single time, and suggested that by spreading the closing hours better results might be obtained. Representatives of manufacturing and commercial interests expressed agreement in any feasible co-operation, standing ready to accept any scheme of opening and closing which will help. The best of feeling was evident. A committee was appointed to work out detailed suggestions as to the best rearrangement of hours for different establishments, taking into account load conditions, character of output, essential nature of products, relation to street railway traffic problems, and other points.

Mr. Halliday discussed the difficulties of land and water transportation affecting New England, and Mr. Knowlton outlined the work of other New England communities and public utilities in fuel economy, emphasizing the importance of favorable water-power legislation by Congress, and touching upon fuel-saving possibilities by individual consumers of central-station service.

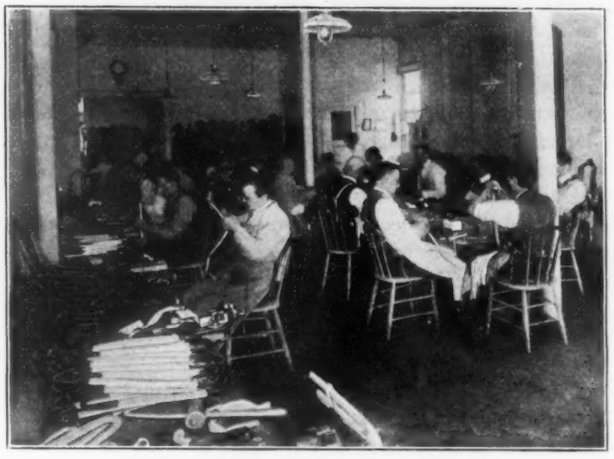
FACTORY WORK FOR MEN BLINDED IN WAR

Instruction of Blind Workers in Plant of Crocker-Wheeler Company Promises Excellent Humane Results for the Future

It is an old story that when a man or woman loses the power of sight he gains unusual skill with the fingers as partial compensation. This fact has made it possible for them to do excellent basket making, chair caning and other manual work that requires quick fingers and patient effort. The difficulty has been that in the selling of most of these articles they had to compete with machine-made articles sold at a low price.

DR. SCHUYLER SKAATS WHEELER INSTRUCTING BLIND WORKMAN HOW TO WIND COILS

Another form of occupation ideally suited for these men and women is being developed by the Crocker-Wheeler Company at its plant in Ampere, N. J. Coils for armatures and similar apparatus must be wound, and no machine has been devised that will do this as well as a workman can do it by hand. The coils of wire are wrapped with tape. Millions of these wire coils are used and their number is growing each year. Wrapping or insulating them with tape is a kind of work very similar to basket weaving and chair caning.



BLIND WORKERS WINDING COILS

A workroom started about two months ago has already brought happiness into the lives of a group of blind men and women. They have learned to do the work and have almost attained the speed of a normal worker.

When these are proficient they will return to their various countries and carry on the work of making the blind self-supporting by instructing the war blind.

STORM AND LIGHTLESS NIGHT DARKEN CHICAGO'S STREETS

Worst Blizzard Since 1884 Ties Up Four States in the Middle West and Street Lighting Suffers—Coal Shortage Feared

What is reputed to be the worst blizzard since the winter of 1884 struck Illinois, Iowa, Wisconsin, Michigan and part of Indiana on Sunday, Jan. 6.

The temperature hung around 25 above zero, and the wind, varying from 40 to 60 miles an hour, caused the snow, which lay from 13 in. to 20 in. (23 cm. to 50 cm.) on the streets, to drift to heights of 10 ft. (3 m.) in some places. Most streets in Chicago were under drifts 3 ft. deep, and along some railroad rights-of-way the drifts were deeper. In many instances long-distance telephone communication was cut off. Surface lines and suburban steam railroads moved almost no trains on Sunday and established only very limited service on Monday.

As Sunday was a lightless night, the street-lighting situation was extremely bad. On account of wire trouble about one-half of the street lamps in Chicago were out. This, added to the fact that all display illumination was turned off, made the Chicago newspapers remark that "it was somewhat dangerous for persons to venture into the streets."

FUEL SUPPLY IS SHORT: WAYS TO CONSERVE IT

Chamber of Commerce Committee on Coal Conservation Working to Encourage Small Economies in Hope of Large Results

Under the title "Small Savings That Count," the committee on coal conservation of the United States Chamber of Commerce has issued a letter to members, in part as follows:

The shortage of coal for every day of the ensuing year amounts to about forty ounces or two and one-half pounds for every man, woman and child in the United States. Great economies in the use of coal will be effected by the factories, the central heating, lighting and power plants and the railroads. But small savings must not be neglected. Some opportunity is presented to every person every day to save coal by reducing the consumption of heat, light or power. The responsibility for making these savings is widely diffused among millions of people. The aggregate importance of them is correspondingly great.

Every ounce of coal saved is an outright contribution to the nation's war-time need for fuel. Some persons may easily save their entire quota of forty ounces each day. The following schedule suggests some of the means for saving small quantities of coal. These savings, in the aggregate, will set free thousands of tons of coal for the industries of the country, for the railroads, for the navy, and for the ships that carry our men and supplies to France.

Conserve electric light. Electric energy usually comes from coal. Consult your dealer as to the most economical types of lamps suitable to your conditions and fixtures. A 25-watt lamp used instead of a 40-watt lamp saves at least an ounce of coal every two hours.

Turn lights off when not needed. If a 25-watt lamp or an ordinary gas light is turned off, even for short intervals, the saving may be an ounce of coal a day for each lamp.

Discard carbon-filament lamps. Substituting a 25-watt tungsten lamp for a 16-cp. carbon-filament lamp provides a better light and saves two or three ounces of coal daily.

Attend to the lubrication of machinery. A drop of oil will often save an ounce of coal. Careful attention to the lubrication of all working parts of machinery will save many pounds of coal in the day.

Do not superheat rooms. Observing the thermometer and turning off radiators to hold the temperature below 70 deg. Fahr. reduces the load on the heating plant.

Conserve all heat and power. Keep in mind that every loss of heat or power is a loss of coal. A leak in a steam connection and a superheated office room are alike the cause of wasted coal. Keeping a heavy power unit in operation when a lighter one would carry the load wastes coal, and so does all unnecessary use of electric elevators.

Use weather stripping and storm windows. A bit of weather stripping about the door and the use of storm windows in offices, schools and all buildings that are heated will reduce the burden on the heating plant and make effective a daily saving of coal.

Discourage electric display illumination. This use of coal is not absolutely necessary. The genius for advertising which originated this excellent method of display should find temporarily other means of expression. Eliminating or forgoing an electric sign may save tons of coal a year.

These methods of saving heat, light and power are not unfamiliar. Every one, perhaps, will think of some effective means of saving which is not included in this list. The important idea to be impressed on every person is that a great need exists for saving coal and that even small savings must not be overlooked.

Saving coal is not always identical with economy to the person effecting the saving. It may be some one else's coal that is saved, or the time and expense required to effect the saving may offset the money advantage. Nevertheless, it is a patriotic duty now to save coal at any reasonable expenditure of time and material. And in the majority of cases there will be a direct or indirect advantage to the person entitled to the credit for the saving.

A voluntary, universal response to the call for saving coal in the many small ways that present themselves every day will insure the success of the great efforts at fuel retrenchment which are now being made in the industries and by central plants.

MASSACHUSETTS BOARD ON WATER POWER CONSERVATION

State Commission Seeks Authority from Legislature to Investigate Questions Involved in Water-Power Conservation and Development

Authority to investigate the possibilities of conserving stream flow in conjunction with the Commission on Waterways and Public Lands is sought by the Massachusetts Gas and Electric Light Commission in its recommendations to the incoming Legislature. The board says:

Two of the companies under the board's supervision [the New England Power Company and Turners Falls Power & Electric Company] transmit and deliver to the industries of the Commonwealth power generated by hydroelectric developments on the Connecticut and Deerfield Rivers. The power so furnished during the present year would have required more than 450,000 tons of coal to produce.

It appeared at the hearings relative to the issue of securities that a projected stream flow conservation undertaking on the Deerfield River would increase the hydroelectric energy developed by that stream to an equivalent of over 150,000 more tons of coal. It also appeared that if the spring freshets were impounded near the principal sources of the Connecticut River and the flow of the stream equalized throughout the year, the output of the three developments on the main stream which are furnishing power to the Commonwealth might be increased over 15 per cent and more than 58,000 tons of coal saved. A similar undertaking on the Millers River would add to such saving over 8400 tons.

Steps have already been taken by the two companies mentioned to investigate the feasibility of storage basins upon certain of the tributaries of the Connecticut River in New Hampshire and Vermont. But any treatment of the full development of rivers as sources of power requires the exercise of governmental powers, and in the case of the Connecticut co-operation of the federal government, as well as of the four states which border upon the river or through which it flows. The board therefore recommends that steps be taken to investigate the feasibility and the legal and political questions involved in this project and the possibility of a similar treatment of the smaller streams whose sources are within the Commonwealth.

It is proposed to report upon this subject to the 1919 Legislature.

PATRIOTIC WORK OF THE NATIONAL DEFENSE COUNCIL

Purpose to Make Available the Best Thought and Effort of Industrial and Professional Life to Prosecute the War

A report of the Council of National Defense just made public covers the history of the council from its inception to the close of the fiscal year ended June 30, 1917. Permanent organization of the council was not effected until March 3, 1917. Director W. S. Gifford says in introduction:

In a broad sense the council and commission have sought to make available to the United States the best thought and effort of American industrial and professional life for the successful prosecution of the war. It has become a truism that no past war has been so essentially a war of the mechanic and the machine, and it is the realization of this truth that has been throughout the inspiration of the policy

pursued by the council, the commission and their subordinate bodies.

The direction of the machinery of American industry for the national defense necessarily involves the creation of an organization of great flexibility. The swift changes in strategy and rapid improvement in war machinery, attended by the equal speed with which implements of warfare are scrapped and replaced at the front, has been reflected by corresponding rapid transformation and stimulation of the industrial organization within the nations at war. These ever-changing developments have necessitated almost unprecedented flexibility in government organizations.

The history of the first three months of the war in the United States has proved no exception. Constantly recurring demands for increases in personnel and for new efforts in unexpected directions have had to be met as the war progressed. It has been the effort of the organization of the Council of National Defense to hold itself in constant readiness to meet such new demands and to shift its ground and expand its facilities in the interest of the national service. It has been in no sense a fixed institution. Its organization has been and of necessity must continue in process of evolution rapid enough to keep abreast with the rapidly changing current of the times and yet conservative enough to prevent confusion or lack of proper co-ordination and control. In a peculiar sense it has felt itself called upon to be constantly ready to "fill in the gaps" and assist the regular departments of the government in their splendid and successful effort to expand and carry the new and huge burdens thrust upon them by the country's need. Flexibility must remain the essence of the spirit with which the council carries on its work.

The National Research Council has served as a department of science and research of the Council of National Defense and in that capacity has been charged with the organization of scientific investigation bearing on the national defense and on industries affected by the war. It has co-operated extensively with foreign scientific missions to this country from the Allies, and has been represented abroad in joint work for the promotion of research service of particular value to the conduct of the war, including the submarine problem and various physical and chemical problems.

It has been the function of the committee on engineering and education to make available to the government in the most effective possible form the services of the engineering and educational professions.

The engineering committee has been appointed by different engineering groups to assist in the solution of problems of engineering policies. In a similar way, through a meeting of the heads of 187 colleges, universities and technical schools, held in Washington on May 5, the work of carrying on the national relation between the colleges and the nation was turned over to the education section. Detailed references are made to the work of the members of the various other committees.

Recently it has become feasible to discontinue the embarrassing situation wherein the members of the present committees are apparently called upon to act both as government agents or advisers and at the same time as representatives of the industries. In dissolving the present co-operative committees of industry, which were appointed by and under the direction of the council, the action is taken only with the highest praise and thanks for their sple did and indispensable work and at the same time with the hope that representative committees of industry will be formed by the industries themselves at the earliest possible moment. Already a number of such committees have been organized. The establishment of such committees, formed so as to entitle them to speak for their entire industries, will render immediately available valuable sources of information upon which the government can draw in connection with the countless business and industrial problems attendant upon the conduct of the work necessary for the prosecution of the war.

DAYTON ENGINEERS' CLUB TO DEDICATE A NEW HOME

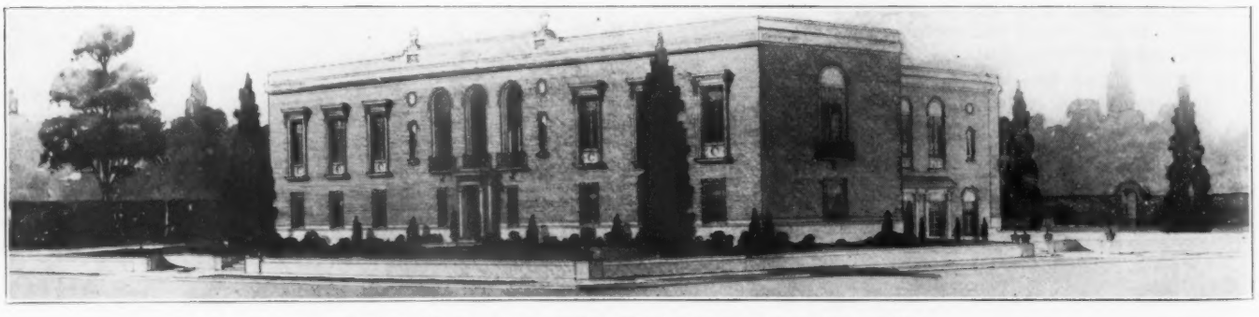
Formal Exercises to Be Held on Feb. 2 to Place Fine Structure at the Service of the Engineering Industries

The new home of the Engineers' Club of Dayton, Ohio, will be dedicated on the afternoon and evening of Feb. 2. It will be a great event in the engineering circles of the entire Miami Valley. The dedicatory exercises are expected to be of decided interest.

At present the club has about 300 members. Col. E. A. Deeds, the president, is chief of the Aircraft Production Board, and is giving his entire time to the war program. The other officers are: First vice-president, C. F. Kettering; second vice-president, Orville Wright; third vice-president, H. M. Waite; recording secretary, H. I. Schenck; treasurer, F. O. Clements; house secretary, W. E. Bingham.

The new building is at the southeast corner of Monument Avenue and Jefferson Street, facing the river.

The pioneering genius has made Dayton unique among American cities. The creative work of Wilbur and Orville Wright has been acknowledged internationally, and Dayton, the birthplace of aviation, to-day has a magnificent airplane factory, one experimental flying field devoted to research and development work, the McCook experimental field of the aircraft engineering department of the United States Signal Corps, and the Wilbur Wright Field, the largest aviation training school in the world.



NEW HOME OF THE ENGINEERS' CLUB OF DAYTON, OHIO

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month on the next-to-last text page.

New York Chapter, A. A. E.—Edmund F. Perkins, consulting engineer, Chicago, president of the American Association of Engineers, will address the New York chapter at the Hotel McAlpin on Tuesday, Jan. 15, at 8 p.m., on the subject "National Association Service for Engineers."

Schenectady Section, A. I. E. E.—John L. Harper, chief engineer Hydraulic Power Company and Cliff Electric Distributing Company of Niagara Falls, N. Y., addressed a meeting of the Schenectady Section of the A. I. E. E. on the subject of "Niagara Power or a Real Coal Shortage?" This meeting was held Jan. 4.

Minneapolis Section, A. I. E. E.—R. F. Pack, general manager of Northern States Power Company and the Minneapolis General Electric Company, was one of the speakers at the meeting of the American Institute of Electrical Engineers at Minneapolis Jan. 11. His subject was "Public Service Corporations and What They Have Done in the War."

New York Section, I. E. S.—On Jan. 10 this section held a meeting in the Engineering Societies Building to discuss the code of lighting school buildings. L. B. Marks, chairman lighting legislation committee, presented the code in abstract, and C. B. Snyder, superintendent of school buildings, Department of Education, city of New York, discussed the practical application of the code.

Vancouver Section, A. I. E. E.—The following officers were elected for the coming year by the Vancouver (B. C.) Section, A. I. E. E.: Chairman, R. F. Hayward; secretary, T. H. Crosby; executive committee, E. P. La Belle, C. N. Beebe and L. B. Philpot. At a recent meeting of this section M. L. G. Robinson presented a paper on "The Present Trend and Development of Electrical Business, with Possibilities for the Future."

Brooklyn Company Section, N. E. L. A.—The December meeting of the Brooklyn Company section of the N. E. L. A. was held in the Y. M. C. A. auditorium on Tuesday evening, Dec. 18, with the largest attendance for the year. Almet F. Jenks, presiding justice of the Appellate Division of the New York State Supreme Court, delivered an address on the world war, contrasting every-day life in Germany with our own. The competition paper entitled "Economy in Ordering Printed Forms," presented by A. O. Kohloff of the purchasing department, pointed out many important features in connection with this subject and was discussed by a number of the members present. Motion pictures and other entertainment were provided.

New York Section, A. S. M. E.—Walter Rautenstrauch addressed the New York Section of the American Society of Mechanical Engineers Jan. 8 on the subject "Relation of Manufacturing to Banking and Research."

Jovian League of New York.—Former Senator Theodore E. Burton addressed the members of the Jovian League of New York on Jan. 9. The following officers and directors were elected for the year 1918: President, James M. Wakeman, Society for Electrical Development; vice-president, George Williams, Henry L. Doherty & Company; vice-president, H. A. Pratt, Westinghouse Electric & Manufacturing Company; secretary, F. M. Feiker, editorial director ELECTRICAL WORLD and *Electrical Merchandising;* treasurer, L. L. Strauss; directors, Arthur Williams, New York Edison Company, and James R. Strong, Tucker Electric Construction Company.

Cleveland Electrical League.—E. J. Laibman of Zhitomir, Russia, spoke before the league on Jan. 3. Whether a separate peace is concluded or not, he declared that from a military standpoint Russia is out of the war for good. A new offensive would be impossible, he said, because the nation is too demoralized to become again a potent military factor. The peasants, he continued, want peace and an education. They may be in sympathy with the Bolsheviki, because the Bolsheviki are promising them things. The peasants do not realize the position in which the country is at the present time. Mr. Laibman was exiled to Siberia by the imperial government for revolutionary activities.

Ohio Electric Light Association at Dayton.—The program for the meeting of the new-business co-operations committee of the Ohio Electric Light Association, to be held Jan. 16 at Dayton, has been arranged as follows: Address of welcome, Judge E. P. Matthews, vice-president Dayton Power & Light Company; "Low-Temperature Industrial Heating," Dwight D. Miller, Society for Electrical Development, with discussion by H. J. Kuhns of Toledo, C. W. Bartlett of Schenectady, N. Y., and Wirth S. Scott of East Pittsburgh, Pa.; luncheon address by George C. Smith of Baltimore, Md., on "Industrial Surveys for Intensified Service; afternoon session—"The Uses of Electricity for the Manufacture of Chemicals," by C. A. Winder of Niagara Falls, with discussion by C. D. Carlson of Cleveland and J. C. Matthieu of Dayton; "Water Pumping by Electricity," by R. L. Yates of Dayton, with discussion by C. I. Crippen of Youngstown, F. H. Hooper of Van Wert, Ohio, and Frank B. Steele of Dayton. At the banquet Judge Roland W. Baggott, Dayton, will be toastmaster. The speakers will be J. W. Lieb of New York on "The Electrical Industry and the War"; J. M. Switzer of Dayton on "The City and the Public Utilities"; D. L. Gaskill of Greenville, C. F. Kettering of Dayton, E. R. Kelsey of Toledo, Le Warren James of Dayton and R. H. Grant of Dayton.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

Chicago Sued for Electricity Bill of $1,900,000.—The Sanitary District of Chicago has filed a suit in the municipal court to collect $1,900,000 from the city of Chicago. The suit includes amounts for electrical construction and for electrical energy for lighting streets and the city hall. The largest item was $1,607,486, principal and interest on construction.

Announcing Change to New Location.—The Worcester (Mass.) Electric Light Company moved recently into a new office at 11 Foster Street, Worcester. In addition to the usual announcements in the press the company is adding a sticker to about 35,000 bills mailed for the current month's service. These stickers are also available for use on packages of lamps, appliances, etc., sold from the new office.

Navy Radio to the Philippines.—Secretary of the Navy Daniels has been surprised by the receipt from Admiral Knight, commanding the Asiatic fleet, of a radio message which announced the successful completion of the chain of high power stations whose construction was authorized by the act of Aug. 22, 1912. The stations comprising this chain are Arlington, Darien, San Diego, Pearl Harbor and Cavite. The Darien station was completed about two years ago, San Diego in March of this year, and Pearl Harbor in October; and while it was known that the acceptance test of the Cavite station was under way, the Secretary was quite unprepared for a message of greeting from Admiral Knight.

French Committee Formed to Cooperate with American Electric Committee for France.—There has been formed in America, on the initiative of Capt. Gustave P. Capart of the general staff of General Pétain, a committee of which Dr. C. O. Mailloux is chairman and which has for its objects, first, to render immediate and effective assistance to the French armies and the national defense of France, and, in addition, to promote in times of peace the relations between French and American industry. As the board of management of the Union des Syndicats de l'Electricité deemed it desirable that there should be in France a corresponding committee, it decided to constitute in the body of the union a special Franco-American committee. The president of the union, G. Cordier, requested F. Meyer, managing director of the Continental Edison Company, to take the chairmanship of this new committee. In accepting this position Mr. Meyer received full power to enlarge the committee by adding to it all persons whose assistance he might deem desirable.

E. B. Craft has been appointed an assistant engineer of the Western Electric Company.

W. F. Hendry has been appointed an assistant engineer of the Western Electric Company.

E. H. Colpitts has been appointed an assistant engineer of the Western Electric Company.

J. F. Olney succeeds H. P. Harley as manager of the Ozark (Ark.) Citizens' Service Light & Power plant.

H. P. Harley, who has been manager of the Ozark (Ark.) Citizens' Service Light & Power plant, has been promoted to be manager of the district, which includes several towns.

Philip I. Robinson, superintendent of the Houghton (Mich.) County Electric Light Company, has been transferred by the Stone & Webster Management Association to the Fort Madison (Iowa) Electric Company.

W. R. Emerson, auditor of the Oklahoma Gas & Electric Company, has been selected as one of six accountants from the United States who will perfect a new system of accounting for the American Red Cross.

Earle L. Milliken has been transferred by the Stone & Webster Management Association from being manager of the Cape Breton Electric Company, Ltd., Sydney, N. S., to be general manager of the Houghton (Mich.) County Electric Light Company.

Monroe J. Frankel, chief of the office of gas and electricity, Louisville, Ky., has resigned. Previously he was in the engineering departments of Fairbanks, Morse & Company at Detroit, Mich., and Indianapolis, Ind. Mr. Frankel is a graduate of the University of Kentucky.

W. R. Thompson, formerly manager of engineering and construction for H. M. Byllesby & Company, has been promoted from captain of the 109th Regiment of Engineers, stationed at Camp Cody, Deming, N. M., to major in the same regiment. Mr. Thompson is a graduate of Pennsylvania State College with the class of 1897. For several years he was engaged in electrical engineering work with J. G. White & Company of New York and later in the engineering department of the company's London branch. He became connected with the British Westinghouse Electric & Manufacturing Company in 1903, where he gave considerable attention to problems of power-house design and heavy steam-railroad electrification. He again entered the employ of J. G. White & Company in the United States in 1906 and two years later became assistant electrical engineer for the Public Service Commission of the First District of New York, subsequently becoming acting electrical engineer. He resigned from this position to become assistant chief engineer for H. M. Byllesby & Company of Chicago, and on Jan. 1, 1913, he became manager of the engineering and construction department of this company, in which work he continued until he entered the army.

Men of the Industry

Changes in Personnel and Position—Biographical Notes

John G. Galloway, a San Francisco consulting engineer, has been appointed a major in the United States Engineer Corps and has been called into service. Mr. Galloway was consulting engineer for the building of what is believed to be the longest single span of wire in the world, the Carquinez crossing of power lines for the Pacific Gas & Electric Company, near Benicia, Cal.

C. H. Andrews, assistant to president and chief engineer of the North Carolina Public Service Company, Greensboro, N. C., has been appointed general superintendent of the Southern Utilities Company, which corporation operates electric, gas and ice properties throughout Florida, under the management of the J. G. White Management Corporation, New York. He will assume his new duties on Jan. 1. Mr. Andrews was graduated from Purdue University, Lafayette, Ind., in 1908, receiving the degree of B. of S. in E. E. After graduation he entered the employ of the Public Service Corporation of New Jersey, serving in the meter department of that company. In 1909 he became connected with the North Carolina Public Service Company. Soon after joining this organization he was appointed superintendent of the light and power department; later on he was made departmental manager of new business; in 1911 he was promoted to the position of assistant general manager, in charge of electric, gas and street railway utilities in Greensboro and High Point, N. C., and in 1917 his position became that of assistant to the president and chief engineer. In connection with his general duties, Mr. Andrews has devoted much time with success to studying the question of rates and their application.

C. H. ANDREWS

Alan Sullivan, secretary of the Canadian Electrical Association, has joined the Royal Flying Corps as an equipment officer.

Prof. O. J. Ferguson, head of the electrical engineering department of the University of Nebraska since 1912, has been made acting dean of the engineering college of that university because of the entrance of Dean O. V. P. Stout into active military service. Professor Ferguson is a graduate of the University of Nebraska, class of 1903, and took his master's degree in electrical engineering in 1909 at Union University, where he was professor of electrical engineering from 1905 to 1912.

L. G. Van Ness, vice-president of the Memphis Gas & Electric Company, has resigned to engage in consulting engineering work in Memphis. After being graduated from the course in electrical engineering at the University of Wisconsin in 1896, Mr. Van Ness was for three years variously engaged in machine-shop, pole-line, wiring, engine, meter and testing work in central stations. In 1899 he associated himself with the Emerson-McMillan company and occupied himself in designing and redesigning many of the electric plants under the control of the company. Conspicuous among the plants on which he worked were those of Columbus, Ohio; Madison, Wis.; San Antonio, Tex.; Montgomery, Ala.; Denver, Col.; St. Paul, Minn.; Lincoln, Neb., and a hydraulic generating and distributing system for Quebec. From purely engineering work he went into the study of cost-rate making and accounting for both electric and gas plants. For two years after this he was associated with the Laclede Gas Light Company of St. Louis and the Union Electric Light & Power Company of the same city. His work there covered a period of two years and included chiefly the revision of the accounting systems. In 1906 Mr. Van Ness went to Memphis, Tenn., to build an electric plant and system for the Merchants' Power Company of that city. He became vice-president and general manager of the company, which position he retained until the rate readjustment and consolidation of Memphis utilities some months ago, when he became vice-president of the new company. From this position he has now resigned, as stated.

Obituary

William Maher, Flushing, L. I., connected with the Long Island Railroad Company at Long Island City in the capacity of stationary engineer for forty years, died Dec. 19.

Henry A. Herrick, who built the Black Eagle dam at Great Falls in 1890, died suddenly at Butte, Mont., Dec. 14, at the age of sixty-one. Mr. Herrick had been identified with the engineering features of practically all dams built along the Missouri River by the Montana Power Company or its predecessors in the last twenty-seven years.

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies.

Discrimination in Rates.—A city ordinance providing that "water meters will be used wherever and whenever in the judgment of the board they should be attached," in the absence of any charge that the meter rate is unreasonable, will not be held unreasonable as discrimination because meter rates are charged against certain consumers and flat rates against other consumers of the same class, nor because small consumers are charged by the room and large consumers according to the quantity of water used, the Supreme Court of North Carolina held (94 S. E. 3).

Injury from Live Guy Wire.—In an action for injuries to one coming in contact with a live guy wire on an electric light pole evidence was held by the Missouri Court of Appeals, in Faris vs. Lawrence County Water, Light & Cold Storage Company (198 S. W. 449), to make plaintiff's contributory negligence in getting close to the pole out of curiosity, on account of the pole being afire, a question for the jury. Persons have a right to travel on streets even to satisfy curiosity, and unless it appears positively that they voluntarily and knowingly come in contact with a live wire or other dangerous agency, or have such knowledge as would suggest caution to an ordinarily prudent person, they are not guilty of contributory negligence. An electric company was prima facie negligent in allowing a dangerous current to escape to a guy wire which had no current breaker or insulator.

Liability for Injuries Received After Assurance of Safety by Foreman.—Where a telephone lineman engaged in painting poles was ordered by his foreman to paint a certain pole, at the top of which were electric power wires, under the foreman's assurance that they were "always dead until after 4 o'clock," the finding that the order given by the foreman was within the scope of his authority as superintendent, and that it was negligent, was warranted, it appearing that the wires carried a potential of 2300 volts, whereby plaintiff received a shock causing him to fall and break his leg, it was held by the Supreme Judicial Court of Massachusetts (117 N. E. 620). A notice of injury under the employers' liability law, stating that the injuries were caused by defective insulation and improper covering of wires on a telephone pole, such wires being charged at a time with an electric current which caused the employee to receive a shock whereby he fell and sustained injuries, was sufficient, without specifying the negligent order of the superintendent in pursuance of which the lineman ascended the pole. A notice of injury under the employers' liability law, alleging defective insulation and improper covering of wires, whereby a lineman fell from a telephone pole which he had climbed in pursuance to orders from his superintendent, was held not to be misleading as to the cause of injury.

Safety Precautions Where Wires May Come in Contact.—Where electric street railroad wires, electric light wires, telephone wires and telegraph wires cross each other those maintaining them are bound to use the highest degree of care, commensurate with the danger occasioned thereby, by the use of such appliances, devices and precautions as are practicable to prevent contact of the wires in the event that any of them should break and fall, the Supreme Court of Kansas held in Lewis vs. Harvey (168 P. 856).

Provisional Valuation Orders of Public Service Commission.—Provisional orders of the Public Service Commission valuing the property of and fixing rates to be charged by a public service corporation for experimental purposes, and retaining the case on its docket for future action after the result of such experiment is ascertained, are not final orders, subject to the control of the court under the Public Service Commission act, it was held by the Supreme Court of Appeals of West Virginia (94 S. E. 121). The valuation of the property of a public servic corporation and prescribing rates for tolls and charges for services to be rendered are purely legislative acts, not subject to judicial review except in so far only as may be necessary to determine whether such rates are void on constitutional or other grounds.

Municipal Plant Discrimination.—Municipal corporations in operating a water plant exercise business and administrative functions rather than those strictly governmental in their nature, and in the exercise of such functions are governed largely by the rules applicable to individuals or private corporations engaged in the same business, the Supreme Court of Oklahoma held (168 P. 800). Municipal corporations operating water plants are not required to give absolute equality of service or rates, but are only required not to act arbitrarily in exercising the discretion vested in them in such matters and not to maintain a discrimination between patrons which is essentially unjust. The law against unjust discriminations rests on public policy, and it is not in violation of the public policy of the State, in the absence of specific legislation on the subject, to permit discriminations by a municipality in favor of a state institution which redounds to the intellectual, moral and commercial benefit of the general public resident in such municipality. Under the facts alleged in the instant case, it was held that the donation of water by the city of Edmond to the Central State Normal School does not constitute an unjust discrimination against a citizen, taxpayer and water consumer of the city who is required to pay a fixed rate for water used by him.

Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities.

Salaries of Utility Officials.—A decision of the New York Public Service Commission, Second District, affecting the Ithaca Traction Corporation, refers thus to salaries: "In the attack which the representatives of the city have made upon the alleged extravagance of the company's operation, considerable stress has been laid upon the number and amounts of the salaries paid, the claim being that the company's salary list is unwarrantably burdensome and that a reasonable allowance for this purpose might materially affect the commission's opinion upon the question before it in the present case. We do not agree with this view. The salaries paid are not in our opinion too high." Higher fares were granted.

Quality of Service.—The Wisconsin Railroad Commission, in a decision affecting the Pulaski Light & Power Company, holds that the electric service furnished by respondent is inadequate; that the equipment is now generally sufficient, but that certain alterations and improvements are necessary; that, as regards night service, it is the standard practice to make such service available at one-half hour after sunset on clear days; that respondent should obtain one of the various tabulations worked out on substantially such basis and govern its operations accordingly; that on cloudy days conditions vary and the time of commencing service must depend upon good judgment; that in case of reasonable doubt, however, as to the necessity for lights at such times the energy should be made available, and that the alterations and improvements specified are necessary for reasonably safe and adequate service.

Development of California Properties.—The Southern Sierras Power Company and the Corona Gas & Electric Light Company have filed with the California Railroad Commission a joint application for authority for the Corona company to lend to the Southern Sierras company for six months $33,000 from its treasury on a promissory note at 6 per cent. Both companies are practically owned by the same interests, the Southern Sierras corporation operating in Inyo, Kern, San Bernardino and Riverside Counties and the Corona in Riverside County only. They have separate offices, but the Sierras concern is planning to buy all the properties of the Corona company and other small associated companies to economize in management. The Southern Sierras company says that since April of this year it has spent or contracted for nearly $400,000 for enlargements, and will need large further sums to complete important work.

TRADE & MARKET CONDITIONS

News of the Trade for the Manufacturer, Wholesaler and Jobber of Electrical Equipment and Supplies— Notes on Industrial Activities and Business Methods

HEATING DEVICE STOCKS CLEANED OUT IN EAST

Extreme Cold Spell, Coupled with Acute Shortage of Coal and Other Fuels, Results in Record Demand for Radiators and Other Appliances

As far as could be learned the stock of radiators and other heating appliances in the East prior to the unexpected arrival of the unprecedented cold weather of last week was as large as it usually is at this time of year under normal conditions. Distributers, jobbers, dealers, hardware and department stores and other retailers of electrical goods in and about New York had made their usual preparations to meet what they supposed would be the customary demand. But when the intense "cold wave" of last week arrived and persisted in hanging on very much longer than any previous record, stock in these lines melted away more rapidly than even the most sanguine believed possible. Coal, oil and every other fuel that could be utilized were exceedingly scarce, and the pressure for electric radiators became acute. Many apartment houses had no coal for three or four days. The market was swept bare and not a heater could be had at any price. Orders for stock on generous lines were wired to the factories and every effort was made to rush express shipments into the city, but without avail. Freight and express were under embargo, and while the goods were in transit none arrived until practical relief came through heavier receipts of fuel expedited by official pressure on the transportation facilities.

As it stands, merchandise of the description on December delivery is now being distributed to the retail houses as rapidly as it reaches the market. During the most acute stage of the cold spell irons, percolators, grills, toasters, pads and every conceivable type of heating appliance that could contribute warmth were not only short but pretty well cleaned out. The situation is far from easy yet, and final relief is not expected by the trade in the East for a couple of weeks at least. The West seemed to be better prepared and conditions were not so strenuous.

EASTERN ELECTRICAL TRADE FEELS FREIGHT CONGESTION

Difficulties Met in Trying to Get Shipment of Motors from Middle Western Concern Expedited

So far as can be learned from leading shippers and receivers of electrical commodities, deliveries have grown worse rather than better. The situation is said to be more acute in the New York territory than at any other point in the country. The congestion of freight and that of unloaded cars causing this condition has reached the stage where drastic action has been found necessary. Secretary McAdoo, Director General of Railroads, has named the week of Jan. 14 to 21 for the unloading of cars which have for months been used by consignees here as warehouses.

As one electrical goods distributer stated, the demurrage of $10 a day, instead of $1 or $2, should have been put into effect months ago. A jobber carrying one of the largest stocks in the country said deliveries are not only a sore spot, but the situation is almost unbearable. Not only is freight affected by the embargoes, but the express companies, which afforded some relief, even at a higher cost, have in some cases embargoed all but direct and incidental government business.

Shipping West to East is the most difficult to accomplish. A Middle West manufacturer of motors, who has an important market in New York, Philadelphia and contiguous territory, says he has tried in vain for over a week to move a shipment taken from stock in the New York and Philadelphia warehouses and going South. To expedite deliveries this manufacturer has a traffic man in Cleveland, Ohio, and one in Buffalo, N. Y., who follow shipments. When the train starts, not only is its number taken, but also that of the car containing the merchandise and that of the engine. In addition, the engineer's name and personal appearance are noted. This information is wired to the man ahead, who in turn is on watch, and so it is followed to destination. This factory's deliveries are behind two months, mainly owing to this congestion of transportation facilities. As yet government railroad control has made no perceptible improvement.

SITUATION TO BE MET IN STOCK REPLENISHMENT

Generally Felt that Orders for Merchandise Should Be Placed Early—Fears Concerning Non-Essentials Crop Up

With a reported tendency to economize in buying, the various interests engaged in the manufacture and distribution of electrical goods were called upon by the ELECTRICAL WORLD to verify the statement, so far as they were concerned. They were also asked whether there would be any trouble, hesitancy or unusual delay in replenishing the stocks of jobbers and dealers in staples. The firms approached, of unquestioned standing and influence in the trade, were found to hold diverse views. It was generally agreed, however, that orders should be placed early if stocks of merchandise were to be replenished and maintained at standard strength and levels.

No disposition toward a pessimistic outlook was voiced. On the contrary, buying, in some instances exceeding expectations, was generally characterized by more conservatism and discrimination. The volume of trade in electrical staples and specialties was well maintained and both manufacturers and sellers were preparing for a busy season. At the present time the larger jobbers appear to be carrying strong stocks and fortifying them at every possible chance, owing to the uncertainty of deliveries. Smaller concerns are spoken of as already feeling the pinch and are said to have been calling on the others to help them out by "borrowing" to relieve the immediate pressure of order filling for dealers and general stores. It is stated that establishments of this caliber will encounter more or less trouble in the replenishment of stocks. Other lines of business are in the same predicament. For instance, on lighting fixtures, with the finished articles following the fluctuations of the metal market in price, it is believed that not only will the demand show a curtailment, but that it will be difficult to get goods. Manufacturers are finding it by no means easy to obtain material; hence they are taking no speculative chances with buyers, whether jobbers, dealers or contractors.

Wire and cables are short in this market, and when it comes to replenishing stock there is a question of deliveries and dependence upon the manufacturers. Some of them just now are described by the distributing trade particularly as efficient and therefore will be prepared to replenish stocks, while others, working around in circles, are an uncertain quantity when it comes to filling and shipping orders in a given time. The avenues of distribution are also seriously considering the probability of certain lines being designated as non-essentials and are acting accordingly when placing orders.

RULING ON GOODS FOR USE IN ONTARIO

All Electrical Equipment Must After April 1 Next Meet with Approval of the Hydro-Electric Power Commission of That Province

The Hydro-Electric Power Commission of Ontario has, under date of Jan. 1, sent out the following notice regarding the sale of electrical products in the Province of Ontario:

"Pursuant to the Power Commission act and amendments thereto, and the rules and regulations of the Hydro-Electric Power Commission covering the design and construction of electrical machinery, apparatus, appliances, devices, material and equipment for use in the generation, transmission, distribution or use of electric power or energy in the Province of Ontario, in connection with any electrical installation or wiring for electric light, heat or power, where the electric pressure delivered to or from the same exceeds 10 volts, manufacturers of, jobbers, agents and dealers in electrical machinery, apparatus, appliances, devices, material and equipment, and others interested, are hereby notified that the commission orders that on and after three months from date of this notice no such electrical machinery, apparatus, appliances, devices, material or equipment used, or to be used, as above may be used or disposed of in the Province of Ontario unless and until the design and construction of same has been submitted to the Hydro-Electric Power Commission of Ontario and approval of such has formally been obtained."

METAL MARKET SITUATION

Copper Buying Sharply Reduced by Lesser Demand—Ample Supply—Tin Scarce and Lead Advancing

An ample supply of copper—at the rate of 50,000,000 lb. per month—is now estimated to be guaranteed for industrial or commercial requirements during the first half of 1918. The demand for this purpose, however, has fallen off sharply in the last six or eight months. An authority states that the difficulty of securing funds to finance power and lighting plant extensions and similar enterprises is held responsible for the smaller buying of copper other than for government uses. This undoubtedly had its influence on the price for base wire which governs the quotations on the various trade commodities. Wire or cable is in a weak position and slightly lower. Rubber-covered wire is a shade off in price also. Solid wire can be shipped from stock, but stranded wire is behind from three weeks to three months on delivery, dependent in large measure upon the varying manufacturing efficiency of the respective individual producers.

Lead is again advancing, but tin, with none offering even at the high figure nominally quoted, is still scarce. It is expected that with the official restrictions placed on the export of Straits tin there will be none received here before the beginning of next May.

NEW YORK METAL MARKET PRICES

	Dec. 31	Jan. 7
	£ s d	£ s d
Copper:		
London, standard spot	110 0 0	110 0 0
Prime Lake	Govt. price 23.50	Govt. price 23.50
Electrolytic	Govt. price 23.50	Govt. price 23.50
Casting	Govt. price 23.50	Govt. price 23.50
Wire base	27.00*	27.00*
Lead, trust price	6.25	6.50
Nickel, ingot	50.00	50.00
Sheet zinc, f.o.b. smelter	19.00	19.00
Spelter, spot	7.82½ to 7.92½	7.82½ to 7.92½
Tin, Straits	85.00†	85.00†
Aluminum, 98 to 99 per cent.	34.00 to 36.00	34.00 to 36.00

OLD METALS

Heavy copper and wire	22.00 to 22.50	22.00 to 22.50
Brass, heavy	14.00 to 14.50	14.00 to 14.50
Brass, light	10.00 to 10.50	10.00 to 10.50
Lead, heavy	5.75 to 6.00	6.00 to 6.12½
Zinc, old scrap	5.00 to 5.50	5.00 to 5.50

*Nominal. †None offering.

THE WEEK IN TRADE

ACTIVITY is the keynote of the manufacturing, distributing and selling branches of the electrical merchandise field. Where shipbuilding and other governmental work is being developed and carried forward on a great scale the buying of heavy or large electrical equipment is notable. In staple lines ordering since the opening of the year is reported as showing no marked curtailment; when it has occurred conservatism in buying is responsible for the reduction. Conduit pipe and line material are stated to be in a precarious position for lack of deliveries. The sale of farm lighting sets, storage batteries, fans, lamps, etc., is developing optimistically.

No specific complaints are heard regarding collections. Not a few reports say they are unusually prompt, while others declare they are fair. Credit restrictions continue to engage the attention of all sections of the trade.

NEW YORK

Notwithstanding the difficulty of securing sufficient labor—skilled and unskilled—manufacturing activities are not appreciably reduced, if they do not continue unabated. With the business outlook rather obscure and likely to continue uncertain in some lines, there is still a disposition on the part of jobbers and dealers to operate with caution. Earnings have been unprecedented. Building operations continue to be quiet. Government requirements remain the dominating influence. The freight congestion is in a particularly serious situation, although the government's action in reducing passenger traffic will undoubtedly have a beneficial effect.

Collections are variously spoken of as slow, fair and prompt, depending greatly upon the vigorous methods of the creditors. Credits are drawn more closely than ever.

RADIATORS.—An acute shortage of radiators and all heating appliances, amounting to practically a bare market, during the recent cold weather of last week was a cause of embarrassment to distributers, jobbers, dealers and the department stores in this district.

LIGHTING FIXTURES.—Stock goods are moving slowly, as has been noted from time to time, on account of flat building conditions. Fixtures made to order are, if possible, in a weaker position, as their sale is limited to special purposes, with an outlook for even a smaller demand, as reported by leaders in the line.

LINE MATERIAL.—Conditions are being very much affected by the scarcity of material. Shipments held up by embargoes east of Pittsburgh are a cause of anxiety on the part of distributers. An order for locust pins placed early in June last has not been delivered yet. An acute shortage is in sight. Yellow-pine cross-arms are also in bad shape. Of three cars ordered six months ago one was received here; the others are "somewhere" in the South in transit. Fir arms are hard to get, as the lumber is being requisitioned by the government for aeroplanes and ships.

COLLECTIONS AND CREDITS.—Generally speaking collections, when energetically looked after, are returning good results. Over-trading is evident and steps are under way to check it. The day of free credit accommodation is gradually passing away hereabouts. Leading jobbing houses are not reducing their efforts toward a more general introduction of trade acceptances in place of open book accounts. Dealers in this section are inclined to regard the innovation askance, but a brief and clear explanation of their financial and credit advantages dissipates this prejudice. An amended or new form of trade acceptance as adopted by the Federal Reserve banks, which supersedes all other forms used heretofore in the trade, is announced.

LAMP CORD.—A scarcity is reported on silk-covered lamp cord. Prices are at the apex, in the view of the jobbing houses, and no further advances are anticipated.

DRY BATTERIES.—Labor conditions and poor deliveries are interfering with the free movement of dry batteries. Stocks are none too strong.

PORCELAIN.—Goods in this line, with the strikes at the factories adjusted, are in better supply and the situation is greatly improved, but yet not up to normal.

LAMPS.—The position of lamps, with the exception of a few types, is much better than formerly. Orders under the new price schedule, effective Jan. 1, are being booked on a larger scale than before. Jobbers are making their assortments broader and along lines more representative for current demands.

BELLS AND GONGS.—The United States Shipping Board Emergency Fleet Corporation is requesting bids this week for 300 lots of call-bell materials. In all, about 3000 2½-in. vibrating bells for use on 10 volts are called for and also 900 6-in. and 300 8-in. vibrating gongs.

CHICAGO

Nothing but optimism over the outlook for 1918 is expressed by the commercial branches of the industry in the Middle West. The last week has been quiet, some companies being still engaged in taking stock and holding sales conferences. At these conferences manufacturers have held out the opinion that, while trade may slow up in certain branches of the industry, it will go ahead at increasing speed in others. The industrial outlook continues bright.

Several inquiries indicating a good volume of business have been received from railroads in the last week. There is some question in the minds of jobbers, however, as to whether or not the government's taking over the railroads will have any effect upon the buying of railroad maintenance supplies. As yet there is no information at hand which would indicate that a change will be made.

Inventories are developing that some jobbers are carrying stocks which are actually considerably larger in volume than those carried in the end of 1916. The statement with regard to this condition is that the railroad situation makes this necessary in order for the jobbers to deliver the goods. Many big shipments are going out of jobbers' stocks these days by express.

WIRE.—Manufacturers have brought their prices down to a 30-cent base. Certain jobbers within the next week will reduce their prices on rubber-covered wire and weatherproof wire to a 30-cent base. Lamp cord is already on the 30-cent base.

MINE SUPPLIES.—Trolley hangers, signaling systems and the like are being bought quite freely by mines in the Northwest. Traveling salesmen in from that territory report unusually successful seasons among the mining companies, but decreasing business from central stations.

CONDUITS.—The government is still taking such large quantities of conduit that some Chicago jobbers have not been able to replenish stock.

FARM LIGHTING SETS.—The salesmen engaged in selling farm lighting plants report that the soft condition of corn throughout the corn belt is responsible for the loss of much of their farm-lighting plant business. While the farmers are prosperous, they are not as prosperous as they expected to be on account of the fact that the elevators cannot store the soft corn, and the farmers hence cannot get their money out of it until it either dries out or is sold in the local community for feeding stock.

AUTOMOBILE SUPPLIES.—While the automobile outlook may be curtailed in the coming year, the accessory and repair market looks especially bright, since it will be necessary for present car owners to use their old cars, which otherwise they might have discarded for new ones. Using old cars means buying more repair equipment. A good season is therefore expected in this branch of the trade.

PORTABLES.—Floor lamps and silk shades were reduced in price from 25 to 33 1/3 per cent immediately following Christmas in an attempt to clear out stock that had been on the floor for some time. The sales were quite successful.

BOSTON

Business continues in fair volume, though a slight falling off is reported during the period of analyzing last year's conditions and results. Inquiries are coming in and recent price advances in fans and lamps seem to be no deterrent to prospective purchasers. The lamp situation is greatly improved and jobbers are well stocked. The coming of longer days will soon be a real factor in easing the lamp stuation still further, combined with the federal "lightless night" program. Jobbers report improved deliveries along many lines; manufacturing facilities are being rapidly brought up to meet present demands and the local stocks of motors are better than for some time. Fan price advances have not yet been passed along to the retail trade and resale contracts are yet to be received by jobbers.

Government demands are very active. One Boston jobber has sold a lamp order to Halifax as a result of the explosion in December. Central stations are pursuing a very conservative policy regarding appliance purchases. Pole-line material is now available at Boston in substantial quantities. Labor conditions are unusually free from disturbance, all danger of a telephone strike having passed. Textile mills are very active. As yet the expected new business from the railroads under government control fails to appear, but it is bound to be a factor in this year's sales. Collections are still a little slow, except where closely followed.

APPLIANCES.—Jobbers are still conservative as to the 1918 outlook, but optimistic reports are in hand respecting the prospects of labor-saving devices, especially irons and washing machines. Industrial heating appliances are in considerable demand. One jobber sold 700 washing machines in 1916, his first year handling these.

LAMPS.—Stocks are much larger and more varied. A 10 per cent advance took place Jan. 1, but this is likely to cause little falling off in the volume of trade. The prospect is for a further accumulation of stocks despite heavy government orders. Jobbers are not yet being supplied on a maximum scale, but one house which recently became agent for a large manufacturer received a heavy initial stock in excess of the normal business allowed under present conditions.

POLE-LINE MATERIAL.—A large jobber specializing in this line reports his stock in ample volume, prices remaining steady and industrial business good. The central-station outlook is for a quiet spring on new construction, but some interconnection of lines and plants should result from the recommendation of the Massachusetts Gas and Electric Light Commission to the Legislature for greater inter-system efficiency.

INDUSTRIAL ELECTRIC TRUCKS.—Inquiries are very active, with considerable government business and keen competition. A delivery of ten days in a drop-frame type of truck was offered the Navy Department last week. Manufacturers are developing this field intensively and the outlook is excellent for the new year.

ATLANTA

Business in general is considerably off this week as compared with the pre-holiday period. New Year's Day falling on Tuesday, thus breaking into the week, combined with a post-inventory lethargy, has tended to slow up orders. But representatives of the various manufacturers and jobbers at this point have begun to cover their territories and business is expected to be equal to, if not greater than, what it was in the last few months of 1917.

The shipbuilding program seems to hold the center of the business activity at this time. The Tennessee Coal & Iron Company's new shipyards near Mobile, Ala., incorporated by the Chickasaw Shipbuilding Company, is one of many instances of the activity in this industry. Speculation is rife regarding Henry Ford's trip South this week in the interest of the government and the location of his large steel shipbuilding plant. With the freight situation growing worse each day at the Eastern ports, it is expected that the facilities of the Southeastern ports will receive more consideration in the shipbuilding program.

Motor manufacturers have received specifications this week covering the electrification of the Saxon Mills and Spartan Mills Nos. 1 and 2, Spartanburg, S. C. Bids on the former mill are to cover 1500 hp. individual and group drive, and those on the latter 4000 hp. group drive. J. E. Serrine & Company, Greenville, S. C., are the engineers. Power will be supplied by the Blue Ridge Power Company, Spartanburg.

The Unity Cotton Mills, Lagrange, Ga., contemplate the purchase of 400 hp. individual motor drive, securing energy from the Columbus Power Company, Columbus, Ga. Specifications covering wiring and motor installation of approximately 4000 hp. for the Langley Mills, Langley, S. C., have been sent out by C. R. Makepeace, engineer, Providence, R. I.

Steam turbine sales for this section were given quite a boost recently by the Emergency Fleet Corporation's purchases to the extent of $1,000,000, covering equipment for ship propulsion.

A few manufacturers and jobbers report a slowing up in collections from municipalities. The theory is advanced that this condition is due to the fact that these municipalities are diverting a large amount of current funds toward abnormal fuel costs. The continued cold spell has tended to increase further the difficulties of the various public utilities depending on coal for fuel.

MOTORS.—The demand for the standard three-phase type has slackened. This is, no doubt, due to a number of causes, such as priority investments, scarcity of fuel, lack of available water power and increasing length of shipment. A number of substantial orders have been placed recently and some big business is in sight, but it is not expected that the pressure on this line will be so great for some time as it was during June, July and August, 1917. There is practically nothing available in local stocks. Prices firm.

FLOODLIGHTING.—Shipbuilding plant and yard construction, together with munition plants and other industries working on war materials, has stimulated the demand for all types of light projection in the Southeast, with good prospects for continued activity in this line. Lamps rated at 200, 400 and 1000 watts are in great demand, the 400-watt size being the most popular.

FANS.—Jobbers and dealers are placing more substantial orders for fans at this time than they did last year, as they are afraid that fans may be put on the luxury or non-essential list later on.

SEATTLE

Staple lines, mainly equipment for ships under construction, are selling about the same as for the past month at peak prices. Wholesalers state that the past year's business was far better than anticipated and are looking forward to still greater activity during 1918. The big increase in retail business last year was due to heavy buying by shipyard workers. This class of buying has increased enormously. Wholesalers state that without a doubt industrial business will hold up and increase in volume during the year in spite of prices considerably higher than last year at this time.

Stocks are not in quite so good shape as last year at this date. Heavy orders are being placed on account of the anticipated difficulty of getting materials to the coast due to railroad congestion, as well as in consideration of the list of non-essentials which dealers expect will be very materially increased within the next few months. The main stock shortages are conduit, particularly black and the ¾-in. size, which is used extensively by the government. The lamp shortage still exists and, if possible, is worse than heretofore reported. The movement of wire in all sizes is about the same, with prices remaining firm. Securing of wire stock is spasmodic, although stocks are in fair shape. Motors are selling satisfactorily in both large and small sizes, with large orders for new mills or shipbuilding plants coming intermittently.

The volume of repair work on small and medium-sized vessels in Puget Sound harbors is gaining steadily and will continue until about March 1. Electrical dealers are realizing a nice business from this source. Owners of repair yards state that the volume is running far ahead of former records. Motors, wire and lamps are being bought for that purpose.

The transfer of all wooden-ship contracts from the Southern pine district to the West Coast fir territory because of speedy delivery is expected by West Coast lumbermen. The establishment of a central purchasing office for standard commodities used in construction of wooden ships will be suggested to the United States Shipping Board by the Washington wooden-ship builders. Shipbuilders are desirous of having the government take over the assembling and distribution of materials used in construction. The Seattle Metal Trades Council, representing 15,000 shipyard workers, recently voted to request the United States Shipping Board to reopen the shipyard wage scale award made last fall and authorize an upward revision of shipyard wages in the Puget Sound district on the ground that the rise in cost of living since Aug. 1 justifies corresponding increase in wages. During the week plans were announced for the establishment of a steel shipbuilding plant in Portland, a machinery installation plant in Aberdeen, and the first unit of the steel plant in Seattle to be equipped with electric furnace and electric machinery. Building is showing no signs of renewed activity with exception of orders for additional structures at Camp Lewis, the Vancouver barracks and the Puget Sound forts.

Relief of congested conditions of the Puget Sound terminals is expected to result speedily from the appointment of a joint committee of railway and steamship officials to devise a solution of the problem. Federalization of railroad lines will lead, it is believed, to an early settlement of terminal problems and is certain to result in an issuance of an order to abandon intraterminal switching. Transcontinental lines are striving to reorganize service, which was disrupted during the past ten days by floods. Work of repairing and rebuilding washed-out bridges in mountain divisions particularly is being rushed under difficulties. Collections fair.

SAN FRANCISCO

Government orders are probably of first importance in point of volume in the San Francisco field just now, even excluding the requirements of the Shipping Board. Construction is under way at the naval training stations, navy yards, military encampments and fortifications, and electrical materials constitute a considerable part of the orders placed for such work.

The time required for Eastern freight deliveries has jumped from seventeen days, which was the average a month or six weeks ago, to thirty to forty days, which is the time in which shipments are now arriving. However, government control of railroads is confidently expected to improve freight shipments.

The California Railroad Commission has decided that government railroad control will not affect the applications for rate increases which electric railways have filed. This news has strengthened electric railway securities, and, with the freight business these lines are developing, the prospects in this field are much better than they have been.

SMALL MOTORS AND TRANSFORMERS.—There is an outlook for a heavy demand in the agricultural field. Stocks are improving in small sizes. About eight months' time is generally desired for motors of more than 50 hp., and about four months on sizes of more than 15 hp. On emergency calls, however, the leading manufacturers do better.

STORAGE BATTERIES.—The demand for automobile storage batteries continues very heavy, but with improved facilities for assembly in San Francisco this demand is being handled satisfactorily. Battery orders for the United States Shipping Board continue heavy, and in recent months the demand from firms which assemble motor trucks on the Pacific Coast has been steadily increasing. The manufacture of farm tractors also calls for an increasing supply.

FARM LIGHTING SETS.—With agricultural district prosperity the attention to farm lighting sets has been renewed, and one of the leading manufacturers reports having sold more equipment of this sort in the last two months than has been placed in the two years previous.

Current Prices of Electrical Supplies

New York and Chicago Quotations

THE prices quoted are those prevailing in standard packages or specified lots on apparatus and appliances in Eastern and Middle West markets at the beginning of business on Monday of this week. They are in all cases the net prices or prices subject to discounts from standard lists of contractors, central stations, dealers and others engaged in the resale of such goods.

Prices in Southern and other nearby markets will rule about the same as those in the Middle West, although slight modifications to cover increased freight and local demands should be expected. In the Far West and on the Pacific Coast the prevailing prices are naturally higher, covering as they must increased freight and the necessity of larger stocks with increased interest and warehouse charges on account of the distances from sources of supply, infrequent turnover of stock and uncertainty as to delivery of goods in transit. Moreover, the Far West presents a wide variation in demand due to a small population spread over a wide area in agricultural and mining communities, as contrasted with the denser population of the East and Middle West, their nearness to the source of supply, the more frequent turnover in stocks and the constant demands which arise in industrial centers. Price variations may be due to difference in grade of products of different manufacturers, to local conditions, or to both.

ARMORED CONDUCTORS, FLEXIBLE STEEL

Single-Conductor

B.&S. Size	List per 1000 Ft.
No. 14 solid	$61.00
No. 12 solid	71.00
No. 10 solid	90.00
No. 8 solid	106.00
No. 6 solid	145.00
No. 10 stranded	95.00
No. 8 stranded	115.00
No. 6 stranded	160.00
No. 4 stranded	205.00
No. 2 stranded	266.00
No. 1 stranded	315.00

Twin-Conductor

No. 14 solid	104.00
No. 12 solid	135.00
No. 10 solid	185.00
No. 8 stranded	235.00
No. 6 stranded	370.00
No. 4 stranded	575.00

NET PRICE AND DISCOUNT PER 1000 FT.—NEW YORK

Single-Conductor

No. 14 Solid

Less than coil ..... +10% to $61.00
Coil to 1000 ft..... — 5% to $59.17

No. 12 Solid

Less than coil ..... +10% to $71.00
Coil to 1000 ft..... —10% to $68.87

Twin-Conductor

No. 14 Solid

Less than coil..... List to $105.00
Coil to 1000 ft..... $70.00 to 10%

No. 12 Solid

Less than coil..... List to $135.00
Coil to 1000 ft..... 10% to $130.95

DISCOUNT—CHICAGO

Single-Conductor

No. 14 Solid

Less than coil..... List +10%
Coil to 1000 ft..... List —10%

No. 12 Solid

Less than coil ..... +10%
Coil to 1000 ft..... —10%

Twin-Conductor

No. 14 Solid

Less than coil ..... List +10%
Coil to 1000 ft..... List —10%

No. 12 Solid

Less than coil ..... +10%
Coil to 1000 ft..... —10%

ATTACHMENT PLUGS

List ranges from $0.22 to $0.30 each.
Standard packages from 100 to 250.

DISCOUNT—NEW YORK

Less than 1/5 std. pkg..... List to 10%
1/5 to std. pkg..... 15% to 20%
Std. pkg ..... 28% to 34%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg..... +20% to 12%
1/5 to std. pkg..... 20%
Std. pkg..... 28% to 44%

BATTERIES, DRY

NEW YORK

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 50	.35	.35
50 to barrel	.31	.32
Barrel lots	.28 to .285	.295

CHICAGO

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 50	.35	.35
50 to barrel	.3175	.3275
Barrel lots	.2875	.2975

CONDUIT, METALLIC FLEXIBLE

Size, In.	Ft. per Coil	List Per 100 Ft.
5/16	250	$5.00
⅜	250	7.50
½	100	10.00
¾	50	13.00
1	50	21.00
1¼	50	26.00
1½	25–50	35.00
2	25–50	45.00
2½	25–50	52.00

NET PER 1000 FT.—NEW YORK

	Less Than Coil	Coil to 1000 Ft.
⅜-in. s. stp.	Net to $75.00	—12% to $69.75
⅜-in. d. stp.	+10% to 70.00	— 9% to 72.00
½-in. s. stp.	List to 100.00	—12% to 93.00
½-in. d. stp.	+10% to 100.00	— 9% to 96.00

NET PER 1000 FT.—CHICAGO

	Less Than Coil	Coil to 1000 Ft.
⅜-in. single strip	$75.00	$63.75
⅜-in. double strip	78.25-78.75	71.25
½-in. single strip	100.00	85.00
½-in. double strip	105.00	95.00

CONDUIT, NON-METALLIC FLEXIBLE

Size, In.	List Per Foot	Size, In.	List Per Foot
7/32	$0.05½	1	$0.25
¼	.06	1¼	.33
⅜	.09	1½	.40
½	.12	1¾	.47
⅝	.15	2	.55
¾	.18	2¼	.65

NET PER 1000 FT.—NEW YORK

	Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in.	$25.00-$55.00	$20.50-$24.75	$20.00-$22.00
¼-in.	$28.00-$60.00	$22.50-27.00	$22.00-$24.00

NET PER 1000 FT.—CHICAGO

	Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in., Net to	$55.00	$25.00-$37.50	$22.50-$24.75
¼-in., Net to	$60.00	$27.00-$30.00	$25.00-$27.00

CONDUIT, COUPLINGS AND ELBOWS. RIGID IRON

Card No. 38

Size, In.	Conduit, List per Foot
¼	$0.08½
⅜	.08½
½	.08½
¾	.11½
1	.17
1¼	.23
1½	.27½
2	.37
2½	.58½
3	.76½

	Couplings, List	Elbows, List
¼	$0.05	$0.19
⅜	.06	.19
½	.07	.19
¾	.10	.25
1	.13	.37
1¼	.17	.45
1½	.21	.50
2	.28	1.10
2½	.40	1.80
3	.60	4.80

DISCOUNT—NEW YORK

	¼ in. to ½ in.	¾ in. to 3 in.
Less than 2500 lb..	4% to 6%	7% to 9%
2500 to 5000 lb....	6% to 9%	9% to 11%

(For galvanized deduct six points from above discounts.)

DISCOUNT—CHICAGO

	¼ in. to ½ in.	¾ in. to 3 in.
Less than 2500 lb.	1.3% to 3.7%	4.3% to 6.7%
2500-5000 lb.	3.3% to 5.7%	6.3% to 8.7%

(For galvanized deduct six points from above discounts.)

FLATIRONS

NEW YORK

List price ..... $5.00 to $6.00
Discount ..... 25% to 30%

CHICAGO

List ..... $5.00 to $6.00
Discount 30%

FUSES, INCLOSED

250-Volt	Std. Pkg.	List
3-amp. to 30-amp.	100	$0.25
35-amp. to 60-amp.	100	.35
65-amp. to 100-amp.	50	.90
110-amp. to 200-amp.	25	2.00
225-amp. to 400-amp.	25	3.60
450-amp. to 600-amp.	10	5.50
600-Volt		
3-amp. to 30-amp.	100	$0.40
35-amp. to 60-amp.	100	.60
65-amp. to 100-amp.	50	1.50
110-amp. to 200-amp.	25	2.50
225-amp. to 400-amp.	25	5.50
450-amp. to 600-amp.	10	8.00

DISCOUNT—NEW YORK

Less than 1/5 std. pkg..... 28%
1/5 to std. pkg..... 38%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg..... 28%
1/5 to std. pkg..... 38%

FUSE PLUGS

3-Amp. to 30-Amp.

NEW YORK

	Per 100 Net
Less than 1/5 std. pkg.	$5.00 to $5.75
1/5 to std. pkg.	4.50

Standard package, 500. List, each, $0.07.

CHICAGO

	Per 100 Net
Less than 1/5 std. pkg.	$6.25
1/5 to std. pkg.	5.25

Standard package, 500. List, each, $0.07.

LAMPS, MAZDA

105 to 125 Volts

	Std. Pkg.	List, Each
Regular, clear:		
10 to 40-watt—B	100	$0.30
60-watt—B	100	.35
100-watt—B	24	.70
75-watt—C	50	.70
100-watt—C	24	1.10
200-watt—C	24	2.20
300-watt—C	24	3.25
Round bulbs, 3½ in., frosted:		
15-watt—G 25	50	.53
25-watt—G 25	50	.55
40-watt—G 25	50	.55
Round bulbs, 3¾ in., frosted:		
60-watt—G 30	24	.77
Round bulbs, 4¾ in., frosted:		
100-watt—G 35	24	1.10

DISCOUNT—NEW YORK

Less than std. pkg.	Net
Std. pkg.	10%

DISCOUNT—CHICAGO

Less than std. pkg.	Net
Std. pkg.	10%

LAMP CORD

Cotton-Covered, Type C, No. 18

NEW YORK

	Per 1000 Ft. Net
Less than coil (250 ft.)	$23.98 to $31.00
Coil to 1000 ft.	$25.82 to 27.90

CHICAGO

	Per 1000 Ft. Net
Less than coil (250 ft.)	$30.00 to $35.60
Coil to 1000 ft.	22.30 to 26.70

LAMP GUARDS, WIRE

Standard packages from 50 to 150.

NEW YORK

Net per 100	$20.00 to $29.00

CHICAGO

Net per 100	$19.25

OUTLET BOXES

Nos.	List, per 100
101—A, A1½, 4 S.C., 6200, 320	$30.00
102—B.A., 6200 S.E., 300, AX, 1½, 4 S.	30.00
103—C.A., 9, 4R, B 1½	25.00
106—F.A., 7, C.S. 1½, 3 R.	20.00

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $10.00 list	25%-37%	20%-32%
$10.00 to $50.00 list	42%-45%	37%-40%

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $10.00 list	40%	35%
$10.00 to $50.00 list	50%	45%

PIPE FITTINGS

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	10%
1/5 to std. pkg.	20%
Std. pkg.	30%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	10%
1/5 to std. pkg.	20%
Std. pkg.	30%

PORCELAIN CLEATS—UNGLAZED

2 and 3 Wire

NEW YORK

	Per 1000 Net
Less than 1/5 std. pkg.	$20.00 to $38.00
1/5 to std. pkg.	19.00 to $20.00

Standard package, 2200. List per 1000, $20.

CHICAGO

	Per 1000 Net
Less than 1/5 std. pkg.	$15.80
1/5 to std. pkg.	14.80

Standard package, 2200. List per 1000, $20.

PORCELAIN KNOBS

NEW YORK

Per 1000 Net	Std. Pkg. 3500 5½ N. C.	Std. Pkg. 4000 —Solid Nail-it—N.C.
Less than 1/5 std. pkg.	$27.50 to $29.00	$30.75
1/5 to std. pkg.	15.60 to 20.75	24.20

CHICAGO

Per 1000 Net	Std. Pkg. 3500 5½ N.C.	Std. Pkg. 4000 —Solid Nail-it—N.C.
Less than 1/5 std. pkg.	$11.85	$30.75
1/5 to std. pkg.	11.10	24.20

SOCKETS AND RECEPTACLES

	Std. Pkg.	List
⅛-in. cap key and push sockets	500	$0.33
⅛-in. cap keyless socket	500	.30
⅛-in. cap pull socket	250	.60

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	15% to 20%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	14%
1/5 std. pkg.	30%

SWITCHES, KNIFE

250-Volt, Front Connections, No Fuse

High Grade:	
30-amp. S. P. S. T.	$0.80
60-amp. S. P. S. T.	1.20
100-amp. S. P. S. T.	2.25
200-amp. S. P. S. T.	3.48
300-amp. S. P. S. T.	5.34
30-amp. D. P. S. T.	1.20
60-amp. D. P. S. T.	1.78
100-amp. D. P. S. T.	3.33
200-amp. D. P. S. T.	5.20
300-amp. D. P. S. T.	8.00
30-amp. 3 P. S. T.	1.80
60-amp. 3 P. S. T.	2.68
100-amp. 3 P. S. T.	5.08
200-amp. 3 P. S. T.	7.80
300-amp. 3 P. S. T.	12.00
Low Grade:	
30-amp. S. P. S. T.	0.42
60-amp. S. P. S. T.	0.74
100-amp. S. P. S. T.	1.50
200-amp. S. P. S. T.	2.70
30-amp. D. P. S. T.	0.68
60-amp. D. P. S. T.	1.22
100-amp. D. P. S. T.	2.50
200-amp. D. P. S. T.	4.50
30-amp. 3 P. S. T.	1.02
60-amp. 3 P. S. T.	1.84
100-amp. 3 P. S. T.	3.76
200-amp. 3 P. S. T.	6.76

DISCOUNT—NEW YORK

	High Grade
Less than $10 list	List to + 5%
$10 to $25 list	11%
$25 to $50 net	14% to 15%
	Low Grade
Less than $10 list	5% to 10%
$10 to $25 list	16%
$25 to $50 list	24% to 25%

DISCOUNT—CHICAGO

	High Grade
Less than $10 list	+5%
$10 to $25 list	—10%
$25 to $50 list	—14%
	Low Grade
Less than $10 list	—5%
$10 to $25 list	—16%
$25 to $50 list	24%

SWITCHES, SNAP AND FLUSH

5-Amp. and 10-Amp., 125-Volt Snap Switches

	Std. Pkg.	List
5-amp. single-pole	250	$0.28
5-amp. single-pole, ind.	250	.32
10-amp. single-pole	100	.48
10-amp. single-pole, ind.	100	.54
5-amp. three-point	100	.54
10-amp. three-point	50	.76
10-amp., 250-volt, D. P.	100	.66

SWITCHES, SNAP AND FLUSH—Cont'd

10-Amp. 250-Volt Push-Button Switches

	Std. Pkg.	List
10-amp. single-pole	100	$0.45
10-amp. three-way	50	.70
10-amp. double-pole	50	.70

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	List
1/5 to std. pkg.	15%
Std. pkg.	28%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	+20% to list
1/5 to std. pkg.	List to —15%
Std. pkg.	List to —30%

SWITCH BOXES, SECTIONAL CONDUIT

Union and Similar—	List Each
No. 155	$0.34
No. 160	.60

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $2.00 list	List	List to + 10%
$2.00 to $10.00 list	10% to 20%	5% to 10%
$10.00 to $50.00 list	20% to 30%	15% to 20%

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $2.00 list	25%	15% to 20%
$2.00 to $10.00 list	25%	20%
$10.00 to $50.00 list	25% to 35%	20% to 25%

TOASTERS, UPRIGHT

NEW YORK

List price	$5.00 to $7.50
Discount	25% to 30%

CHICAGO

List price	$5.50 to $6.00
Discount	30%

WIRE, ANNUNCIATOR

NET PRICE—NEW YORK

	Per Lb. Net.
No. 18, less than full spools.	$0.44¼ to $0.49
No. 18, full spools.	0.43¼ to 0.45

CHICAGO

	Per Lb. Net.
No. 18, less than full spools.	$0.64 to $0.65
No. 18, full spools	0.54 to 0.55

WIRE, RUBBER-COVERED, N. C.

Solid-Conductor, Single-Braid

NEW YORK

	Price per 1000 Ft. Net—		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
11.	$15.00-$18.00	$13.00-$14.00	$11.25-$12.00
12.	23.25- 27.09	21.30- 23.22	19.35- 20.85
10.	32.40- 37.80	29.70- 32.40	27.00 ....
8.	45.70- 53.34	41.90- 45.72	38.00 ....
6.	72.40- 84.42	66.35- 72.40	60.30 ....

CHICAGO

	Price per 1000 Ft. Net—		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
14.	$18.00	$13.50	$12.00
12.	25.33-27.79	23.82-25.33	19.85-20.40
10.	33.24-35.04	30.03-30.47	27.70-28.23
8.	47.04-48.97	41.98-43.12	39.20-39.42
6.	66.46-68.25	62.05-62.43	55.85-56.39

WIRE, WEATHERPROOF

Solid-Conductor, Triple-Braid, Size 4/0 to 8 Inc.

NEW YORK

	Per 100 Lb. Net
Less than 25 lb.	$35.25 to $39.25
25 to 50 lb.	36.25 to ....
50 to 100 lb.	34.25 to 35.25

CHICAGO

	Per 100 Lb. Net
Less than 25 lb.	$40.00 to $40.35
25 to 50 lb.	39.00 to 39.35
50 to 100 lb.	38.00 to 38.35

NEW APPARATUS & APPLIANCES

A Record of Latest Developments and Improvements in Manufacturers' Products Used in the Electrical Field

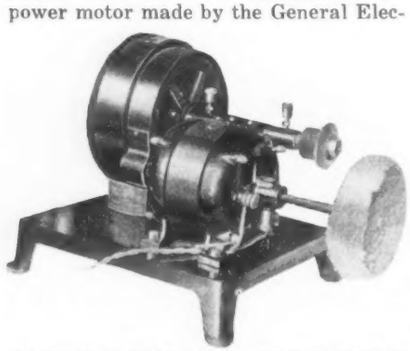
Renewable Cartridge Fuse

The Trico Fuse & Manufacturing Company of Milwaukee, Wis., points out seventeen superior features for its renewable cartridge fuses. Several of the claims made follow. To renew or inspect these fuses in the ferrule type end screws and caps are removed, and in the knife-blade type one cap only is removed. The renewals are powder-filled and carry starting or momentary overloads, yet positively protect apparatus from prolonged overload, it is claimed. No blackening or burning of contacts is had, as the powder smothers the arc. The knife blades and terminals are self-aligning, which insures perfect contact with clips, eliminating blow-outs due to terminal heating. In the ferrule type the cap is screwed over the fiber shell to terminals of renewal cartridge, then secured with a heavy brass screw. In the knife-blade type the renewal elements have solid copper terminals securely bolted to blades, making perfect copper-to-copper contact and doing away with oxidized and burned-out renewal elements due to heating or contact bolts.

Motor-Operated Polishing Machine

The Ernst Koppen organization of New York City has developed a motor-operated knife-cleaning and silver-buffing machine. According to the motor supplied, it can be used on circuits of 110 volts or 220 volts, direct current, or on 60 cycles, alternating current of 110 volts or 220 volts.

The complete device consists of a pair of patented cleaning or polishing brush disks and a fractional-horsepower motor made by the General Electric Company, which drives the disks through gears and besides has a buffing-shaft extension for the buffing of light silverware or rinsing of teapots, etc.



KNIFE-CLEANING AND SILVER-BUFFING MACHINE

The knife cleaning takes place between the brush disks in the inclosed drum on the left of the motor, and the cleaning or polishing brush disks will, it is claimed, serve several hundred thousand knife blades without renewal, which is done at a low cost. The butt of the knife handle is polished by the special attachment at the right end of the back-gear shaft.

Electric Cleaner with Few Parts

The "America" vacuum cleaner, which is just being placed upon the market by the Wise-McClung Manufacturing Company of New Philadelphia, Ohio, is said by the manufacturer to have fewer parts than any other electric cleaner. A number of distinctive features are claimed for this appliance, among them a patented floor brush the design of which permits sewing-room litter, threads, etc., to pass through a center vent direct to the dust bag, thus leaving the brushes always free from accumulation. A positive catch for raising and lowering the nozzle can be adjusted by the tip of the operator's shoe, as can also the patented electric control switch. It is made under the Kenney patent.

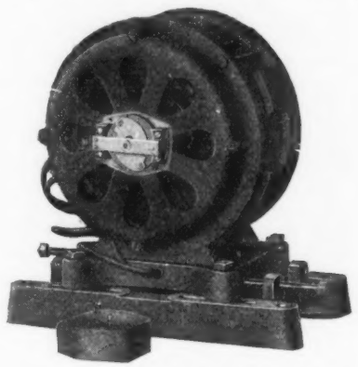
EQUIPPED WITH PATENTED FLOOR BRUSH

Insulating Material

A material which is known as "leatheroid" and comes in sheets of various thicknesses for use in place of fiber is now made by the Leatheroid Manufacturing Company, 43 West Sixteenth Street, New York City. This material is made in different colors, including black, reddish tan and gray. According to tests made by the Electrical Testing Laboratories, New York City, the dielectric strength of this material is about 350 volts per mil thickness. It is now being used by a number of large manufacturing companies as an insulating material.

Alternating-Current Motors

The St. Louis Electrical Works of St. Louis, Mo., have just finished complete development of a full line of alternating-current motors, single-phase motors from ⅛ hp. to 2 hp. and polyphase motors from ½ hp. to 10 hp.



EQUIPPED WITH CENTRIFUGAL STARTING DEVICE

These motors are for a frequency of 60 cycles and a speed of 1750 r.p.m. A speed of 1200 r.p.m. can be furnished in the two-phase and three-phase motors. Any of the frame sizes can be furnished for frequencies of 50, 40, 30 and 25 cycles.

The frame construction is of the skeleton type and so put together as to give excellent ventilation to both the stator and rotor, and the design has been so worked out that the frames are interchangeable for both the single-phase and the polyphase motors. With the use of this special winding and the proportion of the ratio of the rotor to the stator very low iron losses take place.

Ball bearings have been adopted exclusively for these motors. The oiling arrangement is such that all oil that gets to the bearing has to filter through a felt washer that is used in inclosing this bearing. A ball bearing oversized in comparison to that recommended by ball-bearing manufacturers is used at the pulley end of these motors. The rotor construction is such that it acts as a fan for the stator, and this fanning is done by the rotor bars, which extend out.

In the single-phase motors the split-phase winding is used in starting and on all sizes up to and including ½ hp. A centrifugal starting device is furnished. This centrifugal starting arrangement can also be furnished on larger sizes if specified by the purchaser; otherwise a double-throw starting switch is furnished. This centrifugal starting switch is mounted outside the motor on the end plate and rotor shaft. It is completely inclosed

and gives the motor all the features of a completely inclosed motor, still allowing ventilation at the ends. Inside of the end plates of the single-phase motor there is a simple squirrel-cage rotor. This design gives this single-phase motor all the simple features of the ordinary squirrel-cage, two-phase or three-phase motors.

This starting device is so constructed that in breaking the contact which cuts out the starting winding it does it with a snap. The quick break eliminates chattering or the burning of the contact points by arcing. The points used for making and breaking contact are tungsten, which assures minimum wear. The 5-hp., 7½-hp. and 10-hp. motors are furnished with leads brought out so that the motors can be started by the Y-delta starting arrangement if desired. The bringing out of these leads also permits the motor to be connected either for 110 or 220 volts.

Bell-Ringing Transformer

An improved bell-ringing transformer is announced by the Packard Electric Company of Warren, Ohio. The former type made by this company had a brass-bolted two-piece case with lugs projecting from the top and two lower sides, and these have been eliminated by making the heavy porcelain case in one piece. This results in a neater, more compact instrument—the only projecting parts being the bell-wire binding posts and two small slotted flanges on the base to receive the screws by which the instrument is secured in place.

The electrical element is inserted in the case through an opening in the base and then completely covered with a fine grade of sealing compound, thus forming the unit into practically one solid piece. The leads are marked in raised letters on the adjacent porcelain, insuring against any possible mistake in making connections.

The instrument is so made that a dead short circuit on the secondary or bell side for an indefinite length of time will pull less than 15 watts from the 110-volt service wires. The cases are finished in blue with a high glaze which renders the unit attractive to the eye and assists materially in making sales.

Box Connector

Box connectors that are easy to apply and that hold conduit tightly are made by S. R. Fralick & Company, 15 South Clinton Street, Chicago. It is

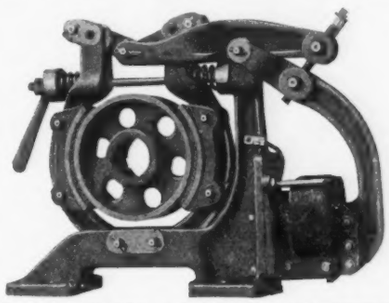
HOLDS CONDUIT TIGHTLY

claimed that there is no danger of the conduits pulling out when these connectors are used. The accompanying illustration clearly shows how this connector is applied and how it holds the conduit. The screw, it is said, eliminates the danger of the conduit pulling out.

Magnetic Brakes

The principle of the type of magnet which has been so successfully incorporated in the design of magnetic controllers by the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa., has been employed by the company in a new design of magnetic brakes just developed for use with mill, crane and hoist motors. The use of a clapper-type magnet eliminates all moving parts within the coil and the consequent wear, sticking or damage to insulation. The modified and improved type A alternating-current brake with which the trade is already familiar and the new type B direct-current brake are similar in operation and have common parts throughout except for the armature lever and magnet.

These brakes are characterized by the quickness of their operation. They respond almost instantly, "releasing" when the power is applied and "setting"



PARTS OF BRAKE ARE READILY ACCESSIBLE

when the power is cut off. This is due to the design of the operating magnet, which gives high initial pull and a very small distance of travel, ¼ in. to 1 in. (6 cm. to 2.5 cm.).

Their operation is similar. When voltage is impressed on the motor the magnet is energized and the magnet armature lever overcomes the pressure of the compression springs through a toggle and releases the brake-shoe grip upon the brake wheel. While the magnet remains unenergized the brake wheel is allowed to rotate freely. As soon as the current is shut off from the motor the brake magnet releases and the compression springs force the shoes against the brake wheel and bring the motor quickly and smoothly to rest without shock or jar. The compression exerted by the springs can be easily adjusted so that any holding or retarding torque up to the full capacity of the brake can be obtained for equal braking effort for both directions of rotation. Simple means for making adjustment for shoe wear are provided.

In case adjustments for shoe wear should be neglected, a safety feature has been introduced so that the brake does not fail to hold the load but the magnet will not release the grip on the brake wheel. This insures proper brake operation and the elimination of accidents due to the brake wheel slipping.

Outlet-Box Receptacle

The Arrow Electric Company of Hartford, Conn., has just placed on the market an outlet-box receptacle with a removable porcelain ring grooved for shade holder. This shade-holder

EQUIPPED WITH A REMOVABLE GROOVED PORCELAIN RING

groove is the new feature of the device, as the receptacle base is nothing more than the standard short type of sign and outlet-box receptacle which has been on the market for a number of years. The ring is threaded sufficiently to support a considerable weight, and it can be fitted to bases, for ordinary cleat wiring, for weatherproof work and for concealed terminals.

Adjustable Light Fixtures

Fixtures that consist of a ball-and-socket arrangement to be secured to the ceiling and a steel rod provided with brass sliding or extension tube which can be drawn out or pushed back over the rod at will are made by the Peter Forg Manufacturing Company of Somerville, Mass. It is pointed out that the ball-and-socket arrangement permits the fixture to be at once adjusted to any desired position. The lower end of the sliding tube is provided with a ball-and-socket clamp, to which the lamp can be readily attached and which permits the lamp to be turned to any desired angle. On this fixture the upper part of the wire is coiled around the rod, and as the lamp is drawn down the coil is extended, the cup at the bottom of the coil pushing the wire back to a close coil as the lamp is raised.

Motor-Operated Vegetable Washer

The American Machinery Company of Philadelphia has developed motor-operating machines for simultaneously paring and washing all hard-root vegetables. These machines are extensively used by the United States government in the navy and all governmental institutions. They remove the outer skin of the vegetables and turn them out ready for cooking.

The machines are made in a variety of sizes suitable for use in restaurants, hotels, hospitals and institutions of various kinds. Power for the machine is obtained from fractional-horsepower motors manufactured by the General Electric Company. The motors are inclosed and are moisture and dust proof, furnished either in direct current or alternating current to meet the service conditions. These motors are regular equipment for these machines.

Trade Notes

HESS & SON, Philadelphia, owing to need of increased manufacturing facilities, have removed from 1031-1033 Chestnut Street to 1302-1304 Filbert Street.

C. P. COLEMAN was elected president of the Worthington Pump & Machinery Company of New York City at a meeting of the board of directors on Dec. 31, 1917.

JOHN N. TIMBERLAKE resigned as power apparatus sales engineer of the Northern Electric Company on his appointment as Montreal (Canada) district sales manager of R. E. T. Pringle, Ltd.

THE MENOMINEE ELECTRIC MANUFACTURING COMPANY, Menominee, Mich., has moved its office and stockroom from 30 Church Street to 150-152 Chambers Street. The change was made Jan. 1.

THE WESTERN ELECTRIC COMPANY of New York City has leased the eight-story building at 152 to 156 West Thirty-sixth Street for a term of years. The building is to be used for a warehouse.

H. H. HOXIE, sales manager of the Electric Railway Manufacturers' Supply Company, has resigned to become associated with the North Coast Electric Supply at Seattle, Wash., of which Harry Byrne is manager.

PERCY E. WRIGHT, consulting mechanical engineer of Seattle, Wash., has taken the management of the Jeffery Manufacturing Company of Columbus, Ohio, for the Northwest and opened offices in the L. C. Smith Building, Seattle.

THE NEW YORK CITY BETTER HOMES EXPOSITION will be held in the Grand Central Palace, New York City, from May 18 to 25, inclusive, under the management of Louis W. Buckley. The floor space to be occupied equals 100,000 sq. ft.

L. W. SHIRLEY, formerly general sales manager for the Link Belt Company of Chicago, is now stationed in Seattle, Wash., as secretary and manager of the Washington Corporation of the Link Belt Company, with plant and offices at 574-576 First Avenue South.

C. G. COX has been transferred as district manager of the McIntosh & Seymour Corporation from St. Louis, Mo., to San Francisco, Cal. The St. Louis office is discontinued. Mr. Powelson, who formerly represented the company in San Francisco, is no longer connected with it.

THE WAR TRADE BOARD, Washington, D. C., has issued bulletin No. 1, containing the complete text of the trading-with-the-enemy act, approved by the President Oct. 6, 1917, and also a full list of the enemy trading list, with the index of the names by countries. Notes on the list are also embodied.

D. GLEISEN, manager of the industrial bearings division of the Hyatt Roller Bearing Company, Newark, N. J., is a mechanical engineer, a graduate of Stevens Institute, and has been connected with the Hyatt company for the last six years. He was formerly assistant manager of the company in charge of bushings sales.

THE CREDIT ASSOCIATION OF THE BUILDING TRADES of New York City has distributed a pamphlet entitled "The Present Trouble with the Building Trades." It relates the causes of the present unsatisfactory conditions in that line of business. The remedy suggested is co-operation between all interests concerned.

JAMES MOREY, formerly representing the Multi Refillable Fuse Company of Chicago, recently absorbed by the Chicago Fuse Company, has become connected with Hathaway & Knott, Inc., electrical merchandise, New York City. Mr. Morey, whose appointment became effective Jan. 2, will travel the Southern territory and Pennsylvania.

NIXON & KIMMEL, electrical engineers and contractors of Spokane, Wash., have been appointed distributers for the Edison storage batteries and Edison farm lighting plants for all territory east of the Cascade Mountains in Washington, and all of Idaho and the western part of Montana. They are also distributers of the Robbins & Myers motors, etc., the Sangamo meters and the Maloney transformers. Nixon & Kimmel have been in Spokane for twenty years.

GARNETT, YOUNG & COMPANY, San Francisco, Cal., announce their succession to the business of the Telephone-Electric Equipment Company, which will be conducted without interruption at San Francisco, Los Angeles, Seattle and Portland, there being no change in the address of the respective offices. The personnel of the management and sales staff is exactly the same as in the old company, while the character and policy of the business holds without modification.

THE TELEPHONE-ELECTRIC EQUIPMENT COMPANY, San Francisco, Cal., is exclusive Pacific Coast sales agent for the following manufacturers: American Electrical Works, Chicago Pump Company, Hart & Hegeman Manufacturing Company, Harvey Hubbell, Inc., Holtzer Cabot Electric Company, National Metal Molding Company, H. T. Paiste Company, Pratt Chuck Company, Simplex Wire & Cable Company and the Stromberg-Carlson Telephone Manufacturing Company.

FRANK J. FOLEY, manager of the mining section of the industrial department of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has taken a position as manager of the mining and traction department of the Edison Storage Battery Company, Orange, N. J. Mr. Foley, who is a graduate of Pratt Institute, Brooklyn, N. Y., has been with the Westinghouse company for twelve years, commencing with the service department in New York City and later being transferred to East Pittsburgh.

FRANK W. HALL has been appointed commercial manager of the Sprague Electric Works of the General Electric Company, New York City. With the exception of a short period Mr. Hall has been connected with the Sprague Works continuously for twenty-two years in various engineering and sales capacities, and for the three years prior to his present appointment occupied the position of sales manager. D. C. Durland, former executive head of the Sprague Electric Works, has resigned to accept the presidency of the Mitchell Motors Company, Inc.

SWISS COMMERCIAL LAWS. — The Swiss commercial laws are analyzed in a new report of the Bureau of Foreign and Domestic Commerce, Washington, D. C., entitled "Commercial Laws of Switzerland," Special Agents' Series No. 150. The bulletin has been prepared primarily for American business men who have dealings in Switzerland, special attention being given to the jurisdiction of the several courts and to partnerships and corporations, powers of attorney, collection of debts, attachment, bankruptcy laws and laws relating to trusts and unfair competition. It is the work of Commercial Agent Archibald J. Wolfe, supplemented by Robert P. Shick of the Philadelphia bar and Phanor James Eder of the New York bar. Copies can be obtained for 10 cents.

New Incorporations

THE KINCANNON SILENT TRANSMISSION COMPANY of Boscobel, Wis., has been incorporated with a capital stock of $3,200 by J. J. Blaine, George C. Kincannon and others.

THE PYRINOL FLASHLIGHT COMPANY of New York, N. Y., has been incorporated with a capital stock of $25,000 by F. Dameric, S. Goodman and N. F. Lefkaditis, 140 Liberty Street, New York City.

THE AUSTRALIAN GENERAL RAILWAY SIGNAL COMPANY of Gates, N. Y., has been chartered with a capital stock of $10,000 by J. S. Fitch, H. Satterlee and L. A. Plumb of Rochester. The company proposes to manufacture railway signals, etc.

THE STANDARD ELECTRIC MANUFACTURING COMPANY of Jersey City, N. J., has been incorporated by Jules E. Brand, H. A. Black and Walter J. Hilton of Jersey City. The company is capitalized at $200,000 and proposes to manufacture electrical appliances of all kinds.

THE EUGENE F. PHILLIPS ELECTRICAL WORKS, Ltd., of Montreal, Que., has been incorporated by Frank B. Common, Francis G. Bush, George R. Drennan and others. The company is capitalized at $4,000,000 and proposes to manufacture hydraulic and compressed-air machinery, devices, etc.

THE BRECO ELECTRIC COMPANY of Toledo, Ohio, has been incorporated by M. G. Lang and H. A. Stafford of the E. Pauck Machine Company. The company is capitalized at $50,000 and proposes to manufacture electric machines for charging storage batteries. The company, it is stated, holds valuable patents on several electrical appliances for automobile equipment, which will be manufactured later on. The office of the company is located at 206 Huron Street.

Trade Publications

BOX CONNECTOR.—S. R. Fralick & Company of Chicago have issued a leaflet descriptive of "Kwikon" box connections.

COAL CONVEYOR. — The Godfrey coal conveyor is illustrated and described in a circular prepared by John F. Godfrey of Elkhart, Ind.

ELECTRIC SOLDERING IRON. — The Dover Manufacturing Company of Dover, Ohio, has issued a folder descriptive of its garage special electric soldering iron.

WATER-COOLING SYSTEM. — Cooling water with sprays is the subject of bulletin No. 71 prepared by the American Spray Company, 26 Cortlandt Street, New York City.

PLUGS AND RECEPTACLES.—Harvey Hubbell, Inc., of Bridgeport, Conn., has prepared a leaflet descriptive of Hubbell interchangeable attachment plugs and T-slot receptacles.

CONDENSERS. — Bulletin No. 50, descriptive of the Rees roturbo patent rotary jet condensers, has been prepared by the Manistee Iron Works Company of Manistee, Mich.

WATT-HOUR METERS. — The General Electric Company of Schenectady, N. Y., has published an erratum to accompany bulletin No. 46,201A, on single-phase watt-hour meters.

INCLOSED FUSES.—"Union" renewable inclosed fuses for 250 volts and 600 volts are described in a leaflet prepared by the Chicago Fuse Manufacturing Company of Chicago and New York.

MILITARY CAMPS OF OUR ALLIES.—The Consolidated Expanded Metal Companies of Braddock, Pa., is distributing a book with this subject which has been copied from a pamphlet issued by the Expanded Metal Company, Ltd., of England.

FIXTURE SOCKETS. — The Wirt Company of Philadelphia, Pa., has published a leaflet entitled "Thrift in Sugar Coats." This leaflet gives information on the various uses of the "Dim-A-Lite" and tests made by the Bureau of Standards on how this device saves electricity.

ELECTRIC WELDING. — The Wilson Welder & Metals Company, Inc., of New York City has prepared its catalog No. 2, on electric welding. This book includes information on the development of the Wilson system, specifications of equipment, portable equipment, size, weight and use of electrodes and schedule of equipment, table of economies, physical tests of welded joints, economy and operation, etc.

DEALERS' CATALOG.—A catalog confined entirely to electric socket and other appliances which may be sold over the counter to consumers has been prepared by the Mohawk Electrical Supply Company of Syracuse, N. Y. It is said that when this catalog was prepared the Goodwin movement of co-operation between the different classes of electrical business, especially that between jobber and contractor-dealers, was in mind. This catalog contains 120 pages.

MANUFACTURE OF IRON AND STEEL. —The Youngstown Sheet & Tube Company, Youngstown, Ohio, has issued an attractive calendar for 1918. It is featured by twelve large two-color illustrations of as many different operations in the manufacture of iron and steel. The plates were made from photographs taken in the works of the company and are both handsome and instructive. The calendar will be sent to any address on receipt of 4 cents in stamps to pay cost of mailing.

FIREBRICK.—Under the title "How Any One Can Make a Jointless, Gas-Tight Furnace Lining," the Betson Plastic Fire Brick Company of Rome, N. Y., has published a sixteen-page illustrated folder showing how the "plastic firebrick" made by it is used in forming one-piece linings for steam-boiler furnaces. The old lining of firebricks or blocks is first removed and the plastic material is then placed in the form of chunks, consolidated with a mallet and smoothed with a trowel, occupying the same thickness as the old lining. The special mechanical process used in the preparation of this material is said to eliminate expansion and contraction with temperature changes, so that not only side walls but also door arches, rear arches and arches for Dutch ovens and other forms of furnace can be formed as solid monolithic structures. After the material has been dried and set by a slow fire for four or five hours the furnace can be put into full service. No molds or special forms are used. The same material is used for baffles in water-tube boilers.

New England States

MANCHESTER, N. H.—The Public Service Commission has authorized the Manchester Traction, Light & Power Company to issue $340,000 in bonds and coupon notes to an amount not exceeding $1,500,000, the proceeds to be used for defraying the cost of new construction, most of which is required for a dam now under construction at Gregg's Falls.

HARWICH, MASS.—The Buzzards Bay Electric Light Company of Falmouth has been granted permission to erect transmission lines in Harwich to enable it to supply electricity to the government aviation plant at Chatham.

HAVERHILL, MASS. — The Haverhill Electric Company is installing a 5000-kw. Westinghouse turbine. J. E. Frank is superintendent.

HUDSON, MASS.—The town officials are planning the installation of a 600-kw. turbine with condenser and an additional boiler in the municipal electric-light plant. George A. Brothers is manager.

IPSWICH, MASS. — The Newburyport (Mass.) Gas & Electric Company has petitioned the selectmen for permission to erect its electric transmission line across certain streets in Ipswich in order to supply electricity to Ipswich Mills.

PALMER, MASS.—The Wright Wire Company is contemplating the construction of a rolling mill in Palmer, to have a daily capacity of 200 tons of steel. The company has purchased the Stephen Jones property on the west side of the Quaboag River, on which the proposed plant will be erected. The plans provide for the construction of a power house a short distance down the river, where 9000 hp. will be generated. George M. Wright of Worcester is president of the company.

WEBSTER, MASS. — Work has been started by the Webster & Southbridge Gas & Electric Company on an addition to its plant in Webster to provide space for five new boilers of 400 hp. each, together with coal-handling and conveying machinery. Overhead bunkers will be built.

BLOOMFIELD, CONN.—The Board of Selectmen is considering extensions to the electric street-lighting system. The service is supplied by the Hartford (Conn.) Electric Light Company.

NEW HAVEN, CONN.—The Public Utilities Commission has given its approval to the petition of the Connecticut Company to erect electric transmission lines in New Haven and North Haven.

NEW HAVEN, CONN.—The Rock River Company, which is developing the water power of the Naugatuck Valley, at an estimated cost of between $4,000,000 and $5,000,000, expects to have the dam built near Stevenson and the water power developed by the latter part of 1918. J. Henry Roraback, attorney for the company, has consulted with Charles J. Bennett, highway commissioner, on the project to build a State highway to take the place of the road that is to be eliminated in connection with the construction of the proposed dam near Stevenson.

NORWICH, CONN.—The Eastern Connecticut Power Company has purchased the Warner property at Trading Cove. The use to which it is to be put has not been made public.

TORRINGTON, CONN.—The proposal to construct three reservoirs, near Torrington, to cost about $1,300,000, is reported to be under consideration. C. H. Preston, Jr., of Waterbury is engineer.

WALLINGFORD, CONN.—The installation of an additional 250-hp. Porcupine boiler, with piping, etc., at the municipal electric-light plant is under consideration. A. L. Pierce is manager.

Middle Atlantic States

BORDER CITY, N. Y.—The Empire Gas & Electric Company has taken over the plant and holdings of the Empire Coke Company. The latter company furnishes gas to the former company, which supplies the cities of Auburn and Geneva and the towns of Waterloo, Seneca Falls and Lyons.

BROOKLYN, N. Y.—Plans have been filed by the E. W. Bliss Company for the erection of a large factory in Fifty-third Street near First Avenue, South Brooklyn. The new building will be 380 ft. by 200 ft., seven stories high, and will cost about $1,400,000.

BUFFALO, N. Y.—The report of Bernard J. McConnell, fire chief, submitted to the City Council, giving an estimate of placing the wires of the fire and police departments underground in various sections of the city, places the cost at about $40,000. If it should be decided to place the wires in Genesee Street, from Jefferson to Bailey, underground, the additional cost is estimated at $20,000.

CITY ISLAND, N. Y.—Plans are being prepared by the Kyle & Purdy Shipbuilding Company, Fordham Street, for the construction of a one-story power house.

IRVINE, N. Y.—Work has begun on the construction of a new power house for the National Forge & Tool Company in Irvine. When completed the plant will furnish electricity for lamps and motors in the village as well as to operate the works of the company.

NEW YORK, N. Y.—The capital stock of the Electric Reduction Company, 50 East Forty-first Street, has been increased from $100,000 to $500,000, to provide for extensions and improvements.

NEW YORK, N. Y.—The contract for the installation of a vacuum cleaner system in the Hotel Commonwealth has been awarded to the Spencer Turbine Cleaner Company of Hartford, Conn. The work consists of a central plant in the basement, with piping extensions to several hundred stations.

NIAGARA FALLS, N. Y.—The Prospect Electric Company of Niagara Falls has secured contracts for the electrical installations at the large plants of the National Electrolytic Company and the Niagara Alkali Company of Niagara Falls.

NORTH TONAWANDA, N. Y.—The capital stock of the Tonawanda Power Company has been increased from $250,000 to $750,000.

ROCHESTER, N. Y. — Notice has been filed by the Rochester Railway & Light Company of an increase in capital stock from $10,250,000 to $17,250,000 for expansion.

SALAMANCA, N. Y.—Contract has been awarded by the Board of Water, Light and Power Commissioners to G. F. Miller & Son, 58 East Elm Street, for the construction of an addition to the municipal electric-lighting plant.

JAMESBURG, N. J.—Plans are being prepared by F. H. Bent, State House, Trenton, for the installation of a new heating system to cost about $5,000 at the New Jersey State Home for Boys.

NEWARK, N. J.—Plans have been prepared by the Butterworth-Judson Company, Avenue R, for the erection of a new one-story power house, about 85 ft. by 95 ft., at its works on Roanoke Avenue, to cost about $24,000.

NEWARK, N. J.—Plans are being considered by the Public Service Railway Company for extending its electric railway system from Newark to Port Newark, via Avenue R, to reach the large shipbuilding plants at the latter place.

CHESTER, PA.—The Philadelphia (Pa.) Electric Company, it is reported, because of war conditions, has abandoned temporarily the construction of its proposed power plant at Beach and Palmer Streets, the preliminary work for which was started last fall.

CONNELLSVILLE, PA.—The West Penn Power Company of Connellsville has filed petitions with the Public Service Commission asking for approval of franchises and contracts with the boroughs of Carmichaels, Bentleyville, North Irwin, Clarksburg, Jefferson and Rices Landing, covering the construction of electric-lighting systems and electric-lighting contracts in the above boroughs.

FRANKFORD, PA.—Contracts will soon be awarded for the construction of an artillery range firing house, power house and bomb-proof building at the Frankford Arsenal for the United States government. Lowest bid was submitted by William R. Dougherty.

HARRISBURG, PA.—The City Council, in its annual budget for the year, has made a requisition for an appropriation of $63,833 for electric street-lighting for a section of the city.

HARRISBURG, PA.—An ordinance has been adopted by the City Council, providing for the consolidation of the lighting, police and fire-alarm bureaus into one department, to be known as the City Electrical Bureau, and which will be in charge of Clark E. Diehl, city electrician.

Construction

News of Projects, Plans, Bids and Contracts. Notes on Work Under Way

HAZLETON, PA.—One of the large turbo-generators in the plant of the Harwood Electric Company was recently damaged by fire, causing a loss of about $25,000.

LANCASTER, PA.—Notice has been filed by the Edison Electric Company with the Public Service Commission of an issue of $7,500 in capital stock, the proceeds to be used in part payment for the acquirement of the property of the Akron Electric Light & Power Company.

MANAYUNK, PA. — Plans have been filed by the Glen Willow Ice Manufacturing Company, 4517 Main Street, for the construction of a power house, 35 ft. by 75 ft. Contract has been awarded to the Brown Construction Company, 4600 Main Street, for construction of building.

NEW BRIGHTON, PA. — The Borough Council has awarded the Beaver County Light Company a contract for lighting the streets of the borough for a period of three years.

PHILADELPHIA, PA. — The United States government is planning the erection of a one-story power house at the Frankford Arsenal, Philadelphia.

PHILADELPHIA, PA.—Plans have been prepared for alterations and improvements in the administration building of the Bell Telephone Company at Eleventh and Filbert Streets.

PHILADELPHIA, PA. — Contract has been awarded by F. A. Poth & Sons, Thirty-first and Jefferson Streets, to Charles Casper, Horner Building, for the construction of an addition to boiler house, to cost about $18,000.

READING, PA.—Notice has been filed with the Public Service Commission by the Metropolitan Edison Company of an issue in capital stock of $316,300, the proceeds to be used for extensions, improvements, etc.

WEST CHESTER, PA. — The Philadelphia Suburban Gas & Electric Company, which has a large electric plant on the Schuylkill River at Crombie, it is reported, is contemplating the erection of an electric transmission line from that place to Coatesville for the purpose of connecting its plant with the power plant of the Chester Valley Electric Company, to be used in case of emergencies. West Chester, Phoenixville and Pottstown are already connected. The Lenape plant is connected by a high-tension line with the Chester Valley Company's plant at Coatesville.

INDIAN HEAD, MD.—Contract has been awarded by the Bureau of Yards and Docks, Navy Department, Washington, D. C., to the Austin Company, Bulletin Building, Philadelphia, Pa., for the construction of an addition to power house, 40 ft. by 60 ft., with other building, 30 ft. by 100 ft., at the naval proving ground at Indian Head, to cost about $40,000; also pulping and poaching house, 60 ft. by 200 ft., with monitor and two blending towers, 38 ft. by 35 ft., and 123 ft. by 35 ft.

RISING SUN, MD.—Bonds to the amount of $8,000 have been sold, the proceeds to be used for improvements to the municipal electric-lighting plant.

CHARLESTON, W. VA.—The West Virginia Water & Electric Company, it is reported, is considering an increase in its capitalization to provide for expansion.

RICHMOND, VA.—Plans are being prepared for a tobacco factory for the Allen & Ginter Tobacco Company, a branch of Liggett & Myers Tobacco Company of St. Louis, Mo. The proposed building will be six stories high, main frontage 86 ft. by 286 ft.; two wings, 86 ft. by 152 ft. and 86 ft. by 109 ft. respectively, forming U-shaped building with boiler house and engine room in the rear. Automatic conveyors to deliver coal to overhead bumpers, automatic sprinkler system and four electric elevators will be installed.

WASHINGTON, D. C.—The Secretary of the Interior recently recommended and the President has approved, the inclusion within a power site reserve of about 196 acres of public land in the Big Sandy River Basin, Ore., in order that this land may be used in connection with the development of power, but not for other purposes. The land recommended for withdrawal is located near or adjacent to Big Sandy River below the mouth of Salmon River. A tract within the Eldorado National Forest, Cal., for power site purposes has also been recommended by the Secretary of the Interior and approved by the President.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., for furnishing at the various navy yards and naval stations supplies as follows: Puget Sound, Wash., Schedule 1646—miscellaneous single and two-conductor lighting and power cable and wire, and interior communication cable. New York, N. Y., Schedule 1647—miscellaneous rubber-covered duplex wire; Schedule 1648—miscel-

laneous twin-cinductor, plain and leaded and armored wire. South Charleston, W. Va., Schedule 1651—miscellaneous wet-tool and power vibrating device drill grinders. Mare Island, Cal., Schedule 1639—400,000 ft. plain bell wire. Application for proposed blanks should designate the schedule desired by number.

North Central States

AKRON, OHIO.—Plans are being prepared by William C. Owne & Company of Cleveland, engineers, for the construction of a factory and power plant for the Akron Biltwell Tire & Rubber Company of Akron.

CLEVELAND, OHIO.—The Elliott Electric Company, manufacturer of electrical devices, contemplates the erection of an addition to its plant.

CLEVELAND, OHIO.—The Canada Gas & Electric Corporation, recently incorporated under the laws of Delaware, with a capital stock of $2,500,000, with headquarters in Cleveland, will open many branches in the principal cities throughout Canada. A branch has already been established in Brandon, Man. The company is contemplating the construction of many plants and all business will be transacted through the headquarters at Cleveland. Electric equipment, wire, generators, transmitters, etc., will be required. Cyrus S. Eaton, Cuyahoga Building, Cleveland, is president.

MONROEVILLE, OHIO. — Connections have been made with the Lake Shore Electric Shore service and the new lighting system was put in operation recently and a 24-hour service established. The municipal plant will be held in readiness for use in case of emergencies. Connections will be made next summer with both the east and west end power plants of the electric company.

OWENSBORO, KY. — Preparations are being made by the Owensboro Home Telephone & Telegraph Company for improvements to its system, including the installation of a new switchboard, etc., to cost about $50,000. Contracts have been awarded for the work.

UZ, KY.—The West Virginia & Kentucky Coal Company, it is reported, would like to receive prices on copper wire, hangers and bonds. Thomas P. Jones of Uz is manager.

INDIANAPOLIS, IND.—The William A. Corroa Electric Company, a Missouri corporation, has been granted a charter to do an electrical contracting business in Indiana. C. E. Crowley of East Chicago, Ind., is named as agent.

KENDALVILLE, IND. — Improvements are being made to the water-works system, including the construction of a 500,000-gal. reservoir (completed) and the installation of three motor-driven centrifugal pumps, already contracted for and to be installed in April. S. E. Dickinson is superintendent.

PIERCETON, IND. — Plans are being considered to secure electricity from Winona, 7 miles west of Pierceton, in the spring, to operate the municipal electric-lighting system. About 65 hp. in motors have been installed during the last year. J. R. Winsley is superintendent.

CENTRALIA, ILL. — The Southern Illinois Light & Power Company of Hillsboro has taken over the utility plants in Centralia and, it is said, will make this city a distributing center for various systems controlled by the company. The plants which will be controlled from Centralia are at Mount Vernon, Du Quoin, Chester, Sparta, Collinsville, Litchfield, Hillsboro and Nashville.

KEWANEE, ILL.—The City Council has awarded the contract for wiring the new water-works plant to Messrs. Smith and May.

MURPHYSBORO, ILL.—Application has been filed with the Public Utilities Commission by the Murphysboro & Southern Illinois Railway Company for permission to issue $63,000 in capital stock and $250,000 in bonds. The company is constructing a railway between Murphysboro and Carbondale, and the new capital is desired to extend the car line from Carbondale to Carterville or to Herrin.

ROCKFORD, ILL.—The Rockford Electric Company is equipping its former power plant at the corner of Wyman and Chestnut Streets as an auxiliary heating station.

MINNEAPOLIS, MINN. — Plans have been announced for the reconstruction of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company's railway from the Minneapolis terminal at Seventh Street and Third Avenue, N, to Northfield and Faribault, to cost approximately $750,000. If the plans go through the road will be equipped for electrical operation for freight and heavy traffic as well as for passenger traffic. C. T. Bratnober, who was receiver for the railroad, is in charge of the proposed plan.

ST. PAUL, MINN.—The Twin City Rapid Transit Company of Minneapolis is erecting an automatic substation at Concord and Isabel Streets, St. Paul. The new station will have an output of 2000 hp.

EDDYVILLE, IOWA. — An election will be called within 60 days to vote on the proposal to issue $10,000 in bonds for improvements to the municipal electric-light plant. It is proposed to change the system from direct current to alternating current. A. Lieberman is manager.

GRUNDY CENTER, IOWA.—The Grundy Center Electric Company is erecting about 5 miles of electric transmission lines to supply electricity in the farming districts. J. B. Calderwood is owner and manager.

SUMNER, IOWA.—The erection of an electric transmission line between Sumner and Tripoli is reported to be under consideration.

GREGORY LANDING, MO.—The Gregory Drainage District is contemplating the construction of a pumping station, to cost about $75,000. The Edmund T. Perkins Engineering Company of Quincy, Ill., is engineer.

KANSAS CITY, MO.—The Southwestern Bell Telephone Company has awarded the general contract to the Swenson Construction Company, Shubert Theater Building, for construction of a new telephone building 14 stories and basement, at the corner of Eleventh and Oak Streets, to cost about $800,000.

KANSAS CITY, MO.—The city officials have authorized R. E. McDonnell, of the enginering firm of Burns & McDonnell, and Burton Lowther, chief engineer of the water department, to make surveys to establish the first unit of a municipal electric-light plant in conjunction with the Turkey Creek pumping station of the water works system. It is proposed to install a plant at the Turkey Creek station to provide electricity for that district bounded by Twelfth and Thirty-fifth Streets, from Main Street to the State Line.

OREGON, MO.—The City Council is considering the purchase of electricity to operate the municipal electric-lighting system from the St. Joseph Transmission Company for a period of ten years.

ST. LOUIS, MO.—F. C. Adams of St. Louis has been appointed chairman of the committee representing the electrical interests of St. Louis on the board of a permanent organization which has been formed to urge the advantages which this city possesses as a center for the manufacture of materials for the government which will be needed in the prosecution of the war.

BELFIELD, N. D.—The City Council is considering the purchase of the Chrystler Light & Power Company, to be owned and operated by the municipality.

BLOOMFIELD, NEB.—The Nebraska Electric Company of Cedar Rapids, Iowa, has been granted permission by the State Railway Commission to erect an electric transmission line between Bloomfield and Hartington. The company operates electric plants at both towns and desires to connect them for commercial purposes. This, it is understood, is the beginning of a transmission system to cover most of northeastern Nebraska.

OMAHA, NEB.—The City Council has decided to install an ornamental lighting system on Leavenworth Street, from Sixteenth Street to Park Avenue. Lamps similar to those on Farnam Street will be used.

CHANUTE, KAN.—Contracts have been awarded by the Commissioners of Public Utilities for improvements to the municipal electric-light plant as follows: For building to George A. Copley of Chanute, at $4,440, and to the Merkle Machinery Company, Inter-State Building, Mo., for boilers and machinery, at $19,900.

MACKSVILLE, KAN. — The local electric light plant, it is reported, was recently damaged by fire.

WICHITA, KAN.—Bids will be received by the Wesley Hospital Commission, care of O. A. Rorabaugh, chairman of building commission, Wichita, until Jan. 15 for construction of hospital building, five stories and basement, 236 ft. by 44 ft., with wings, 44 ft. by 16 ft., and 58 ft. by 44 ft., including steam heating, plumbing, electric wiring, telephone system, silent call system ventilating fans, vacuum cleaner, freight and passenger elevators, etc. The cost of the first unit is estimated at $250,000. Richards, McCarty & Bulford, Columbus, Ohio, are architects. A. H. Kagy, 402 Sedgwick Block, is local manager.

Southern States

LEXINGTON, N. C.—The Columbia Power Company has filed an amendment to its charter increasing its capital stock to $250,000. Dermitt Shemwell is president.

SOUTHERN PINES, N. C.—John T. Patrick of Southern Pines, it is reported, is in the market for electrical machinery (second-hand) for a water-power development of from 25 to 50 hp.

ATLANTA, GA.—Plans have been adopted by the City Council for the installation of an electric generating plant at the city crematory, to cost about $75,000. The Georgia Railway & Power Company has agreed to purchase all electrical energy generated at the plant, paying for it at the same rate that the city now pays the company for electricity for lighting and power purposes.

PORT WENTWORTH, GA.—Plans have been prepared by Sprout, Waldron & Company of Muncy, Pa., for the construction of a meal mill and grain elevator for the Port Wentworth Mill & Elevator Company, recently organized. Fred C. Beckham is manager.

GAINESVILLE, GA. — The Southern Bell Telephone & Telegraph Company has awarded contract to A. J. Krebs & Son of Atlanta, for construction of new exchange building in Gainesville. The company also plans to change all stations to drop system and place overhead wires in the business district underground. The cost of the improvements is estimated at $50,000.

JACKSONVILLE, FLA.—The Jacksonville Traction Company has been granted a franchise by the County Commissioners to construct a car line from Ortega to Camp.

MEMPHIS, TENN.—The Memphis Gas & Electric Company has purchased 1100 acres of coal lands at Mannington, Christian County, with two mines already developed, which it will operate to obtain its coal supply.

FLORENCE, ALA.—Contract has been awarded by the Ammonium Nitrate Air Nitrates Corporation, controlled by the United States government, for designing and constructing manufacturing buildings, workmen's houses, streets, sewers for a complete plant, excepting power plant, for the manufacture of ammonium nitrate, near Muscle Shoals, to the Westinghouse, Church, Kerr Company, 37 Wall Street, New York, N. Y. J. W. Young of New York, N. Y., is superintendent of construction at Florence; F. E. Caldwell of New York, N. Y., is resident engineer at Florence.

MOBILE, ALA.—The Mobile Electric Company is planning to erect an electric transmission line (5 miles long) to supply electricity to the plant of the Chickasaw Shipbuilding Company, now under construction.

MOBILE, ALA.—The Mobile & Ohio Railroad Company is contemplating improvements to grain elevator and pier on which it is located, involving an expenditure of about $115,000. The proposed work will include reconstruction of a 250,000-bushel grain elevator, which has been out of commission 10 years; replacing steam power with electrically-operated machinery, building 600 ft. of overhead conveyor in order to convey grain to ships. R. C. Stone Engineering Company, Merchants' Exchange Building, St. Louis, Mo., will have charge of installation of elevator machinery. B. A. Wood, chief engineer of maintenance of ways and structures of the company, will have charge of the proposed improvements.

ONEONTA, ALA.—The plant and holdings of the Oneonta Utility, Water & Light Company have been purchased by the Alabama Water Company. The new owners, it is stated, will install new pumps, mains and fire hydrants at once.

GULFPORT, MISS.—The local power house of the Gulfport & Mississippi Traction Company, which supplies electricity in Gulfport, Ocean Springs, Pass Christian, Handsboro and Biloxi, was recently badly damaged. The plant had been idle for some days owing to a strike.

MAGEE, MISS.—Contract has been awarded to the Inglenook Construction Company of Birmingham, Ala., for the construction of buildings for nurses' home, servants' building, power house and cold-storage plant at the Mississippi State Tubercular Sanitorium. B. Price, 518 Empire Building, Birmingham, Ala., is architect. For information address Dr. Henry Boswell, at Magee.

BARATARIA, LA.—Bids will be received at the Bureau of Yards and Docks, Navy Department Washington, D. C., until Jan. 21 for constructing two 125-ft. steel towers on concrete and timber pile foundations, one 12,000-gal. water tank, dormitory and receiving buildings with equip-

ment and water, electric-light and power and sewerage systems at the Naval Radio station at Barataria Bay, La. Drawings and specifications (No. 2686) may be obtained upon application to the above bureau or to the commandant of the naval station, New Orleans.

THIBODAUX, LA.—The Southern Traction & Utilities Company, it is reported, is planning to construct an electric railway from Donaldson to Bayou Lafourche, a distance of 56 miles. Practically all of the right of way has been secured. C. C. Barton of Albemarle is president of the company.

BRISTOW, OKLA.—The City Council is considering taking over the local electric-light plant, to be owned and operated by the municipality. The price, it is understood, is placed at $25,000.

CHANDLER, OKLA. — The Chandler Electric Company, it is reported, is contemplating the construction of a new power house and installation of new equipment.

HOOKER, OKLA.—The electrical apparatus in the municipal electric-light plant was recently destroyed by fire, causing a loss of about $22,000. There was no insurance and the city will have to issue bonds to install a new plant.

MIAMI, OKLA.—Plans are being considered by the Bilharz Mining Company for the construction of a central electric power plant to supply energy for plants 1, 2 and 3.

SAPULPA, OKLA.—The board of education has awarded the general contract to the Manhattan Construction Company of Muskogee for construction of high school building at $179,872. Contract for heating and electric wiring has not yet been placed.

SEMINOLE, OKLA.—At an election held recently bonds to the amount of $5,000 were voted for the installation of an electric-light plant.

BURNET, TEX.—The power house at the mine of the Southwestern Graphite Mine was recently destroyed by fire, causing a loss of about $6,000.

McALLEN, TEX.—The Rio Grande Public Service Corporation contemplates extensive improvements to its local plant, involving an expenditure of about $40,000. R. F. McCord is manager.

ORANGE, TEX.—The Orange (Tex.) County Irrigation Canal Company is contemplating the installation of a new pumping plant, to cost about $25,000.

SABINAL, TEX.—The electric plant and ice factory of the Sabinal Light & Ice Company has been purchased by R. T. Robinson of San Antonio. The new owner, it is understood, will enlarge the plant and make other improvements to the property.

SAN BENITO, TEX. — The Commonwealth Electric Light & Water Company is planning to enlarge its power house and will install a new 100-hp. engine and other equipment in its plant.

SAN MARCOS, TEX.—Bids will be received until Jan. 14 by A. C. Goeth, of Austin, president of the State Normal School Board of Regents, Austin, for the construction of buildings, including heating, plumbing and wiring, for the Southwest Texas State Normal School at San Marcos and Sam Houston State Normal School at Huntsville. C. H. Page & Brothers of Austin are architects for the school at San Marcos, and Endress & Watkins, Austin and Houston, are architects for the school at Huntsville.

Pacific and Mountain States

SEATTLE, WASH.—The City Council has authorized the erection of a substation for the Light Department on B 166 Gilman Park Addition, and appropriated $20,000 for same.

SEATTLE, WASH.—An ordinance has been introduced in the City Council directing the Board of Public Works to purchase the railway and equipment of the Loyal Railway Company, to be operated as a part of the municipal street car system. Harry Whitney Treat, owner of the Loyal Heights line, has agreed to sell the property for $40,000.

SHELTON, WASH.—The Commissioners of Mason County have granted the Shelton Light & Power Company a franchise to erect and operate electric transmission lines over the highways of Mason County.

SPOKANE, WASH.—Plans have been prepared by the Washington Water Power Company for extending its electric transmission line into Coeur d'Alene. The company is planning to issue $2,800,000 in notes, of which $640,000 will be used for extensions and improvements and the remainder for refunding purposes.

TACOMA, WASH.—Plans are being considered for placing the electric wires of the Municipal Electric Light Department underground, for which estimates of cost are being prepared.

BANDON, ORE.—Contract has been awarded by the Glenisch & Joplin Condensed Milk Company of Portland to the Northwest Process Company of Portland for the construction of a milk condensing plant in Bandon, to cost about $100,000. The building, 106 ft. by 240 ft., two stories, will be located on the water front with a detached power house, 40 ft. by 60 ft.

BYRON, CAL.—Improvements are being made by the Sierras & San Francisco Power Company of San Francisco, which supplies electricity in this district, involving an expenditure of $25,000, to meet the demands for electrical service for irrigation and other purposes. The work will include the erection of a 17,000-volt transmission line from pumping plant No. 1 of the Byron-Bethany system to plant No. 4, near the Brentwood border, a distance of about 12 miles. Later the local distribution lines in Byron and Brentwood will be rebuilt.

CHICO, CAL.—The City Council is considering a proposal submitted by the Northern California Power Company for lighting the streets of the city for a period of four years. The company agrees to furnish electricity to maintain the entire system at $275 per month. The contract provides for larger lamps in the residence districts, the cost of which has not yet been determined, and which the city will bear.

CORONA, CAL.—The Southern Sierras Power Company, which operates in Inyo, Kern, San Bernardino and Riverside Counties, is planning to take over the property and holdings of the Corona Gas & Electric Light Company, which operates in Riverside County. Both companies are practically owned by the same interests.

EUREKA, CAL.—The Rolph Shipbuilding Company has taken over the Bendixson ship timber mill, which it proposes to enlarge and equip for electric motor drive. Electrical service is supplied by the Western States Gas & Electric Company, which is installing a larger transformer at the yards of the company.

HANFORD, CAL. — The city trustees have entered into a contract with the H. G. Lacey Company for service for the downtown electric-lighting district for a period of two years, at $11,400.

LA GRANGE, CAL.—The Railroad Commission has authorized the Sierra & San Francisco Power Company to use $13,670 from the sale of its $1,000 000 bond issue for additions and improvements to the La Grange division of the Yosemite Power Company, recently purchased by the company.

OAKLAND, CAL.—The Commission Merchants' Protective Association has petitioned the City Council for the installation of additional street lamps on lower Franklin Street.

OAKLAND, CAL.—The Kings Electric Company, Oakland Bank of Savings Building, has been awarded contract for electrical work in public library building at Fifty-sixth Street and San Pablo Avenue, at $1,955; also for public library building at Fifty-second Street and Telegraph Avenue, at $1,955.

PALO ALTO, CAL.—The City Council has decided to call a special election to vote on the proposal to issue $66,000 in bonds for the purchase of a Diesel engine and electric generator for the municipal electric-light plant.

RIVERSIDE, CAL. — The National Ice Company, it is understood, is contemplating using electricity instead of water power to operate its plant.

RIVERSIDE, CAL.—The Board of Public Utilities Commission has decided to offer for sale to the Southern California Edison Company all the city pole line north of the city limits, provided it will move the point of delivery from Palm and Mount Vernon Avenues in San Bernardino County to the Riverside city limits on La Cadena drive. If the sale is not consummated a rental agreement may be made whereby the Edison company will secure the use of the poles for an extension of its transmission lines to the city limits.

SAN BERNARDINO, CAL.—Extensive improvements are contemplated by the Atchison, Topeka & Santa Fé Railroad Company at its local works which include the construction of a new blacksmith shop, an electric power plant and subway. The cost of the electric plant and blacksmith shop is estimated at $240,000.

SALT LAKE CITY, UTAH.—A permit has been granted the Latter Day Saints Church to erect a power plant, to cost about $30,000.

SALT LAKE CITY, UTAH.—An agreement subject to the approval of the State Public Utilities Commission is to be entered into between the Commissioners of Salt Lake County, the Utah Power & Light Company and the Progress Company for lighting the public roads and streets of the county with electricity for a period of 20 years. Under the terms of the contract the company is to furnish a minimum of 400 lamps.

LIBERTY, ARIZ.—The mining company at Liberty, it is reported, contemplates the installation of electric lighting, water and sewer systems for the proposed town near the mine. Lescher & Kibbey of Phoenix are engineers.

CASPER, WYO.—The electric plant of the Natrona Power Company was recently destroyed by fire, causing a loss of about $150,000.

CARSON CITY, NEV.—The Board of City Trustees is considering extending the street-lighting system throughout the city. The Truckee River General Electric Company of Reno furnishes electrical service in Carson City.

RATON, N. M.—The Superior Coal Company of Raton, it is reported, is in the market for a second-hand storage battery locomotive, 36-in. gage, with 12 nickel-iron batteries, preferably Jeffrey make.

SILVER CITY, N. M.—The large Diesel engine in the plant of the Silver City Power Company was recently damaged by an explosion, causing a loss of about $10,000.

Canada

BASSANO, ALTA.—The purchase of an electrically driven pumping unit, to cost about $2,000, is under consideration by the Water Works Department. George W. Murgatroyd is engineer.

NELSON, B. C.—Application has been made to the council by the Kootenay General Hospital for the installation of an electric-lighting system, to cost about $1,180.

VANCOUVER, B. C.—The British Columbia Telephone Company is planning to lay another submarine cable across False Creek, work on which will soon begin.

VANCOUVER, B. C.—An electric-lighting plant, it is understood, will be installed at the shipbuilding yards of J. J. Coughlan & Sons; also 12 electrically operated cranes.

BARTON TOWNSHIP, ONT.—The township of Barton is considering the purchase of electrical equipment, to cost about $55,000.

GALT, ONT.—A by-law has been passed by the ratepayers appropriating $45,000 to pay for extension to municipal hydroelectric system.

MERRICKVILLE, ONT.—The Rideau Power Company has authorized the Hydro-Electric Power Commission of Ontario to prepare plans and purchase the necessary equipment for high-tension service for its power house in order to supply power to the commission.

RENFREW, ONT.—The International Molybdenum Company is planning to remove its plant from Orillia to Renfrew. Power for operating the plant will be secured from the Calabogie Light & Power Company.

TORONTO, ONT. — The Hydro-Electric Power Commission, it is reported, is planning to build a third tunnel at the plant of the Ontario Power Company (the plant purchased by the Hydro-Electric Commission), which it is expected will develop an additional 50,000 hp., to be utilized by plants manufacturing munitions for the war. Work, it is understood, will begin at once and will be completed within a few months. The cost is estimated from $1,500,000 to $2,000,000.

WELLINGTON, ONT.—The Town Council is considering an issue of $10,000 in debentures for the purpose of purchasing the local electric-lighting system and remodeling it. The Niles estate, owner of the distributing system, has agreed to sell it to the town for $3,000.

WHITBY, ONT.—Work has begun in Whitby on a track from the station on the Grand Trunk main line to the military hospital on the lake front. This road will be the initial unit of street railway system in Whitby, authorized by a vote of the municipality in adopting the Hydro radial proposal from Toronto to Whitby.

VALLEYFIELD, QUE.—The Montreal Cottons, Ltd., it is understood, will rebuild its power plant, recently destroyed by fire, at once, causing a loss of about $100,000. The plant had a generating capacity of 4300 hp.

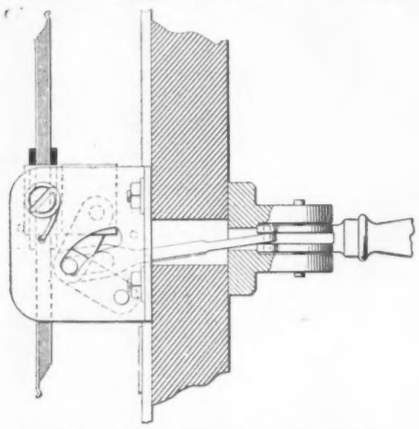
Record of Electrical Patents

Notes on United States Patents

(Issued Dec. 18, 1917)

1,250,129. Incandescent Electric Lamp Socket; Carl H. Bissell, Syracuse, N. Y. App. filed June 22, 1911. Comprises, generally, a base having two sections, one of the sections being formed with a recess opening through the end face thereof opposed to the other section, and such other section serving as a closure for the recess, wire terminals and lamp-contact terminals carried by the base, a switch being placed in the recess.

1,250,140. Process for Loosening the Skins of Tomatoes and the Like; William H. Chapman, Portland, Me. App. filed April 25, 1917. A comb conductor charged with high-voltage alternating



1,250,324.—Electrical Switch Instrumentality.

electricity is located adjacent to the tomato and the apparatus is so formed and manipulated that all portions of the skin are presented to the discharging points.

1,250,142. Buffer for Railway Cars; Samuel S. Cole, Cokeburg, Pa. App. filed May 8, 1917. Improvements.

1,250,146. Electrolytic Apparatus; John Coulson, Wilkinsburg, Pa. App. filed Jan. 6, 1917. Improvements.

1,250,152. Automatic Switch; Carl W. Eisenmann, Nebraska City, Neb. App. filed April 5, 1916. For use in connection with storage-battery systems.

1,250,164. Synchronous-Booster Rotary Converter; Floyd T. Hague, Pittsburgh, Pa. App. filed Nov. 12, 1915. Provides means for the exact regulation of the commutating field in order to insure effective commutation under all conditions of load.

1,250,175. Jumper Cable Tap; Albert F. Hills, Syracuse, N. Y. App. filed June 19, 1911. Comprises, generally, a body, a fixed jaw carried by the body, and a spring-pressed jaw movable toward and from the fixed jaw.

1,250,188. Engine-Starting System; Charles F. Kettering and William A. Chryst, Dayton, Ohio. App. filed Sept. 13, 1913. Improvements.

1,250,192. Telephone Repeating Instrument; Charles D. Lanning, Boston, Mass. App. filed Jan. 21, 1901. Improvements.

1,250,210. Fluid-Pressure-Controlled Switch; Harry Y. Norwood and Fred K. Taylor, Rochester, N. Y. App. filed May 20, 1915. Improvements.

1,250,211. Control System; Stanley G. Nottage, Wilkinsburg, Pa. App. filed Oct. 9, 1915. For dynamo-electric machines.

1,250,231. Electrically Propelled Vehicle; Theodore H. Schoff, Pittsburgh, Pa. App. filed May 3, 1915. Improvements.

1,250,243. System of Distribution; Norman W. Storer, Pittsburgh, Pa. App. filed April 4, 1914. Means for supplying a suitably low voltage to a receiving circuit from a supply circuit of relatively high voltage.

1,250,250. Highway Signaling Apparatus for Railroad Service; Eugene W. Vogel, Oak Park, Ill. App. filed June 5, 1914. Grade crossings.

1,250,286. Electrolytic Apparatus; John Coulson, Wilkinsburg, Pa. App. filed Jan. 6, 1917. Means for forming each set of plates composing such apparatus from a single set of film-forming material.

1,250,290. Control Mechanism for Preventing Excessive Speed of Motor Vehicles; Richard A. Duncan, Adelaide, South Australia, Australia. App. filed Dec. 28, 1915. Improvements.

1,250,302. Electric Light Controller; Raphael A. Granquist, West Duluth, Minn. App. filed April 8, 1914. The apparatus is constructed in such a manner as to permit of its being housed in the canopies of the fixtures so as to be concealed from view and yet ready of access should repairs be necessary.

1,250,324. Electrical Switch Instrumentality; Hubert F. Krantz, Brooklyn, N. Y. App. filed March 13, 1915. Creates a compact few-part switch-moving mechanism conducive to a greatly simplified panelboard arrangement.

1,250,342. Receptacle for Electric Lamps; Axel V. Olson, San Francisco, Cal. App. filed July 8, 1914. Sign receptacle.

1,250,387. Electric Insulator; Percy H. Thomas, Upper Montclair, N. J. App. filed May 16, 1913. Insulator is of the suspension type and is adapted to extra-high-tension service.

1,250,401. Electric Hammer; Alex. Wendelburg, New York, N. Y. App. filed July 28, 1914. Improvements.

1,250,467. Pipe Clamp; Frederick I. Johnson, Warren, R. I. App. filed Feb. 1, 1917. For grounding or bonding electric wires.

1,250,501. Electric Switch; Clarence D. Platt, Bridgeport, Conn. App. filed Aug. 2, 1916. Improved.

1,250,502. Combination Electric Switch; John E. Powers, Pike, N. Y. App. filed Jan. 8, 1917. For use in connection with automobiles or other vehicles.

1,250,536. Electric Distributing System; William L. Waters, Milwaukee, Wis. App. filed May 25, 1914. Improvements.

1,250,708. Emergency Stop for Electrically Driven Apparatus; Caswell D. Swett, Redwood City, Cal. App. filed April 5, 1916. Improvements.

1,250,716. Holder for Telephone Receivers; Katherine G. Townsend, New York, N. Y. App. filed Jan. 27, 1917. Low-cost device.

1,250,718. Dynamo-Electric Machine; William A. Turbayne, Niagara Falls, N. Y. App. filed Dec. 24, 1912. Adapted for efficient operation as a motor where great variations in speed are desired.

1,250,719. Variable-Speed Motor; William A. Turbayne, Niagara Falls, N. Y. App. filed Dec. 31, 1912. Improved means for reducing the effects of armature reaction at high speed.

1,250,720. Starting and Lighting System; William A. Turbayne, Niagara Falls, N. Y. App. filed Dec. 26, 1912. Close inherent regulation is obtained.

1,250,731. X-Ray System; Harry F. Waite, New York, N. Y. App. filed March 22, 1917. Hot cathode is employed.

1,250,743. Electrically Protected Holder for Pocketbooks and Similar Articles; John P. Williams, New York, N. Y. App. filed July 28, 1915. Improved.

1,250,746. Time-Limit Tripping Mechanism; George Wolff, Berlin, Germany. App. filed Jan. 21, 1914. Improvements.

1,250,752. Apparatus for Producing an Electromotive Force for Special Wave Form; Ernest F. W. Alexanderson, Schenectady, N. Y. App. filed Aug. 22, 1914. Improvements.

1,250,754. Electric-Circuit Controller; Johan M. Andersen, Boston, Mass. App. filed April 29, 1914. Means for locking the movable member of the switch in its closed position, so as to prevent accidental opening of the switch.

1,250,757. Electrode Used in the Electrolytic Process of Refining Metals; Frank L. Antisell, Perth Amboy, N. J. App. filed Feb. 8, 1913. Improvements in anodes and cathodes used in the multiple system in the electrolytic process of refining copper and other metals.

1,250,769. Signaling System; Clarence E. Beach, Binghamton, N. Y. App. filed Dec. 18, 1916. May be employed as combination fire-alarm and police signaling systems, as combination watchman's time detector and fire-alarm systems, as combination watchman's time detector, fire-alarm and police call systems, and as combination fire dismissal and fire-alarm systems adapted for use in factories and buildings where many persons congregate.

1,250,782. Electric Clock; John G. Blessing, Chicago, Ill. App. filed April 2, 1917. Ratchet mechanism and electric switch are simplified.

1,250,804. Selective Signaling System; Leslie E. Coon, Chatham, N. J. App. filed June 18, 1917. Provides means whereby an audible signal, such as a single-stroke bell, may be operated at all stations simultaneously and in consonance with impulses from an extraneous source, such as time signals over a telegraph line.

1,250,806. Time-Limit Relay; James R. Craighead, Schenectady, N. Y. App. filed Sept. 2, 1914. Improvements.

1,250,815. Incandescent Lamp; Frank M. Dorsey, Cleveland, Ohio. App. filed Feb. 5, 1914. Tungsten or like metal.

1,250,834. Current Regulator; Charles Le G. Fortescue, Pittsburgh, Pa. App. filed June 21, 1912. Relates to constant-current regulators and to systems of distribution embodying the same.

1,250,835. Electrical Distributing System; Charles Le G. Fortescue, Pittsburgh, Pa. App. filed June 21, 1912. Special relation to alternating-current rectifying systems comprising constant-current regulators.

1,250,854. Electrical Registering System; Charles L. Goodrum, New York, N. Y. App. filed June 29, 1916. Telephone.

1,250,856. Electric Soldering Iron; James T. Griffin, Oak Park, Ill. App. filed Jan. 3, 1916. Separable parts.

1,250,870. Magneto-Dynamo Unit; Otto Heins, New York, N. Y. App. filed Aug. 12, 1915. Improvements.

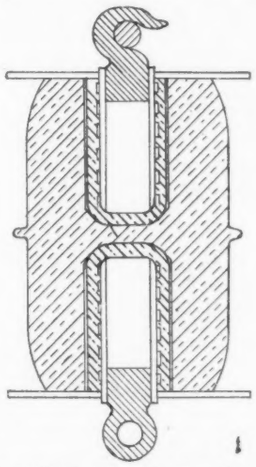
1,250,879. Method of and Apparatus for Fractionating Hydrocarbons; Leon E. Hirt, Los Angeles, Cal. App. filed Oct. 21, 1916. Simple and highly effective manner.

1,250,885. Automatic Telephone-Exchange System; Carl A. W. Hultman, Stockholm, Sweden. App. filed March 15, 1915. Improvements.

1,250,904. Circuit Breaker; Bennett M. Leece, Cleveland, Ohio. App. filed Aug. 23, 1916. Adapted for use with ignition systems.

1,250,906. Control System for Electric Motors; Jesse J. Linebaugh, Schenectady, N. Y. App. filed July 30, 1914. Improvements.

1,250,921. Telephone Apparatus; Harold T. Martin, New York, N. Y. App. filed July 28, 1914. Provision of convenient means in connection with the device for



1,250,387—Electric Insulator

readily connecting a plurality of instruments in circuit with the conductors of the reel.

(Issued Dec. 25, 1917)

14,416 (Reissue). Fuse Device; Edmund O. Schweitzer and Alfred Herz, Chicago, Ill. App. filed April 3, 1907. Prevents arcing upon the operation of the fuse and thereby permits the use of fuses on currents of high potential with perfect safety.